The Alberta Journal of Educational Research

Vol. XVIII, No. 1 *March, 1972*

CONTENTS

Effects of Age of School Entrance on Intelligence 1
G. J. Anderson and J. P. Hanrahan

Dimensions of the High School Student's Role 8
J. J. Bergen and D. Deiseach

An Experiment in Classroom Management 15
D. B. Black and W. E. Goding

Barriers to the Education of Children from Low Income Families 30
E. A. Blowers

Educational Quality Indices 35
D. A. Dawson

Intelligence and Socioeconomic Status in a Canadian Sample 45
K. F. Kennett

A Tested Theory of Student Unrest 51
L. Lehtiniemi

Developmental Patterns in Elemental Reading: Phoneme Discrimination 59
P. C. Smythe, Madeline Hardy, R. G. Stennett, and H. R. Wilson

FACULTY OF EDUCATION
The University of Alberta

EDITOR'S NOTES

AJER is one of thirty-three journals in the humanities and social sciences which have been awarded publication grants for 1972 by the Canada Council. We are grateful for this financial support which will enable us to improve the service we offer to our readers and contributors.

.....

In spite of the financial assistance mentioned above, we have found it necessary to increase the subscription rate. The new rate is $6.00 per year effective immediately; the student rate and the three-year discount have been discontinued. Increasing costs in all categories of expenditures have forced these changes which are the first since 1966 and only the second in AJER's eighteen-year period of publication.

.....

The book review section and the detailed notes on contributors have been discontinued in favor of including at least one more article than has been normal in each issue.

.....

The attention of prospective contributors is drawn to the guidelines on the preparation of manuscripts which appear on the inside back cover. Publication of acceptable manuscripts is frequently delayed because authors have failed to adhere to our general style and format in the initial submission.

.....

We would be pleased to publish notes and comments on articles which appear in AJER. Comments which reach us by May 1st and which are accepted for publication will be included in the June issue.

E.M.

The Alberta Journal of Educational Research *Vol. XVIII, No. 1, March, 1972*

G. J. ANDERSON
and
J. P. HANRAHAN

Effects of Age of School Entrance on Intelligence[1]

The purpose of this study was to determine whether any differences in a measure of mental ability taken at the grade four level could be attributed to differences in chronological age of children at the time of school entrance. Subjects consisted of 1,922 children who entered grade one in September, 1963 and who completed the Henmon-Nelson Test of Mental Abilities in grade four. This sample included children at various ages of school entrance, with and without kindergarten experience, at three levels of socioeconomic status. Analysis of variance results suggest a relationship between age of school entrance and IQ in the fourth grade for children both with and without kindergarten experience. (Dr. Anderson is Assistant Director of The Atlantic Institute of Education in Halifax, Nova Scotia; Mr. Hanrahan is currently completing doctoral studies at the University of London.)

Most North American school systems make use of a rigidly defined age-based criterion for school entrance. In any year, those children born before a certain calendar date are admitted to school a year before those born after the specified date. Thus, for some, a birthday one day earlier in the year would have required school entrance a full year earlier. As the regulations now stand such children remain in a non-school environment as much as a year longer than their peers. What are the effects of such practices on the mental development of children? Some may argue that the first grade environment is at least as intellectually stimulating as the equivalent year spent outside of school. Obviously there are differences between the classroom and the home with respect to the physical environment, peer group influence and the amount and quality of exposure to adults. These differences, moreover, presumably relate also to such factors as the sex of the child and the socioeconomic environment as represented in the home, the community, and the school. The purpose of

[1] This study was completed when both authors were in the Faculty of Education at McGill University. Thanks are extended to Richard Shaw for his assistance with data collection and analysis, to Herbert J. Walberg for comments on the paper, and to the Protestant School Board of Greater Montreal for their cooperation.

this study was to attempt to determine whether any differences in a measure of mental ability taken at the grade four level can be attributed to differences in the chronological age of children at the time of school entrance.

Early studies with disadvantaged and orphan children (Barrett & Kosh, 1930; Wells & Arthur, 1939; Skeels & Dye, 1939) report dramatic increases in measured I.Q. of children who were put in a school environment over controls who were left in the home. The Skeels & Dye (1939) sample was followed up and the initial differences appeared to be maintained a full 21 years later (see Grey & Miller, 1967). More recent investigations using culturally and organically deprived children in pre-school environments (Kirk, 1958; Deutsch, 1965; Weikart, 1967) report similar results in favor of those receiving experimental school programs.

Recent studies of culturally deprived Negro children (Grey & Klaus, 1966; Sprigle, Van de Riet & Van de Riet, 1967; Bereiter & Engelmann, 1966) also tend to report gains in I.Q. for those given enriched pre-school programs, though there is some question about the permanence of such gains (Weikart, 1967; Hanrahan, 1970). Studies of non-disadvantaged children in nursery school and kindergarten programs point to some inconsistencies. Positive effects of such programs on I.Q. have been reported by Wooley (1925), Goodenough (1928), and Gill (1967); Douglas & Ross (1964) report positive effects at age 8 but a reversal in effect at ages 11 and 15. The causal factor in all of these studies could be a result of both the specific training received and the fact that such children are admitted into a school environment at a younger age than that of their peers. If age is a factor, results imply that those entering school young tend to raise their I.Q. scores relative to controls who enter school later.

In terms of age of school entrance itself, Langerak's (1960) study is one of the most extensive. About 2,000 Iowa public school children, categorized into four age levels at the time of school entrance, formed the sample. For both sexes, with the exception of one cell, the youngest entrants had Otis Alpha I.Q.'s which at the grade two level ranged from 3 to 8 points higher than those of their older peers. Unfortunately, children who repeated any grade up to grade six were excluded from the sample. It is possible that these dropouts included a disproportionately high number of children from the lower social classes. Though less extensive, studies by Nicholson (1957), Burwin (1968), Horvath (1960) and Bellins (1963) report results consistent with those of Langerak (1960).

This study is essentially a replication and extension of Langerak's (1960) earlier work. Children at various ages of school entrance with and without kindergarten experience at three levels of socio-economic status were compared at the grade four level. The study extends Langerak's (1960) investigation by including a measure of school socio-economic status and by exploring differences in the age of entrance effect for those who attended kindergarten as contrasted to those who entered school a year later directly into first grade. Thus, the age effect on I.Q. is examined both four and five years subsequent to school entrance. It was hypothesized that differences would favor the youngest entrants and that the effects would be greater at the lower levels of socio-economic status.

Method

Procedure

The school system which participated in the study employs a September 30th deadline for school entrance such that those born October 1 do not enter grade one until they are roughly 83.5 months of age; whereas children born September 30 enter grade one at age of 72.5 months. For purposes of analysis, the subjects were divided into those born in each of the four quarters of the year (January-March, April-June, July-September, October-December) and having mean ages at entrance to grade one of 79.5 months, 76.5 months, 73.5 months, and 82.5 months, respectively.

It was not considered feasible to classify each pupil according to his individual socio-economic status (SES). Alternatively, each of the schools in the study was rated both by employees of the school system and according to census data, and the resulting three levels of SES were applied to each of the pupils in a particular school. Thus the measure of SES employed is essentially a school variable, rather than a characteristic of the individual subject.

Although school attendance is compulsory from the grade one level, some parents choose not to send their children to kindergarten. In order to determine whether or not effects would differ for the kindergarten and non-kindergarten groups, separate analyses were made for each of the two subsamples as well as for the total sample. Thus a determination of the relationship between age at school entrance and I.Q. was obtainable when the entrance took place in kindergarten or a year later, directly to grade one. We should emphasize that normally the kindergarten effect would have been included as a factor in the design. We chose not to do so for two reasons: first, the absence of recorded kindergarten attendance is not sufficient evidence to insure that a child in fact did not attend; second, the decision to keep a child at home is not a random effect. Thus, the kindergarten effect as measured here is "messy" and it was not considered justifiable to increase the complexity of the analysis by including it as a main effect.

In the school system used in the study, the Henmon-Nelson Test of Mental Ability (Lamke & Nelson, 1957) is completed by all fourth grade children during a one-week period in the fall of the year. The test purports to measure "those aspects of mental ability which are important for success in academic work and in similar endeavors outside the classroom (Lamke & Nelson, 1957, p. 3)", and has a reliability of approximately .95. The tests are group-administered and are scored on the basis of age, the difference between age levels being three months. Test scores were taken from the permanent files on each child.

A 2 (Sex) x 3 (SES) x 4 (Age) analysis of variance was completed for kindergarten, non-kindergarten, and pooled samples separately. As the main effects of sex and SES are not the subjects of this investigation, only their interactions with the age effect will be considered in the subsequent discussion.

Sample

Fifty-eight schools in the Montreal Metropolitan area provided 1922 English speaking Protestant subjects who had entered the school system

in September, 1963 and who had completed the Henmon-Nelson Test of Mental Abilities (Lamke & Nelson, 1957) in grade four. An additional eighteen schools considered to contain a majority of children with mainly non-native Canadian ethnic backgrounds were excluded. Pupils who had repeated grades were sought out and also included in the analysis.

The breakdown of the total sample by age at school entrance and SES is shown in Table 1. Cell sizes for the two subsamples have not been included to conserve space; relevant tables are available from the authors.

TABLE 1

CELL SIZES FOR TOTAL SAMPLE

Average Age at School Entrance	High SES		Middle SES		Low SES		Total
	M	F	M	F	M	F	
73.5 mos.	94	81	88	81	68	79	491
76.5 mos.	107	102	86	87	74	74	530
79.5 mos.	83	91	82	71	71	70	468
82.5 mos.	84	60	80	61	72	76	433
Total	368	334	336	300	285	299	1922

Results and Discussion

Cell means and standard deviations for the two subsamples are also available from the authors; statistics for the pooled sample are shown in Table 2. Table 3 summarizes the results of the three analyses of variance.

TABLE 2

CELL MEANS AND STANDARD DEVIATIONS FOR TOTAL SAMPLE

Average Age at School Entrance	High SES		Middle SES		Low SES	
	M	F	M	F	M	F
73.5 mos.	115.73	113.43	114.83	116.02	107.15	112.44
	11.72	20.73	13.19	9.59	9.87	10.76
76.5 mos.	112.22	117.19	113.19	112.01	108.18	110.57
	11.20	9.98	11.34	12.53	12.62	11.01
79.5 mos.	113.11	115.36	112.04	111.54	105.45	107.53
	11.85	9.45	13.33	11.64	17.18	17.00
82.5 mos.	108.69	115.48	109.68	107.75	103.54	107.58
	11.98	10.64	12.97	22.89	10.17	17.29

TABLE 3

ANALYSIS OF VARIANCE RESULTS FOR TOTAL, KINDERGARTEN, AND NON-KINDERGARTEN SAMPLES

Source	Total Sample		Kindergarten Sample		Non-Kindergarten Sample	
	F	*P*	*F*	*P*	*F*	*P*
Main Effects						
SES (A)	35.3	.0001	27.4	.0001	11.3	.0001
Sex (B)	11.3	.0008	20.1	.0001	.2	.6539
Age (C)	10.2	.0001	3.7	.0121	6.9	.0002
Interactions						
AB	4.2	.0153	2.3	.1027	2.6	.0780
AC	.9	.5079	0.4	.8953	1.3	.2722
BC	.5	.7161	3.1	.0265	2.6	.0545
ABC	2.1	.0515	1.4	.2030	1.6	.1198

The overall results (see Table 3) suggest statistically significant findings for the main effects, a significant SES x Sex interaction in the total sample and a significant Sex x Age interaction in the kindergarten group, and approaching significance ($p = .0545$) in the non-kindergarten sample. Significance for the three-way interaction was approached in the total sample only ($p = .0515$). Table 2 shows a trend for those who entered school youngest to score highest on the measure of mental ability. The progression reverses, however, in the sample of High SES females. With this exception, only 10 of the remaining 60 cell means are out of sequence, implying that the I.Q. difference increases as the age difference increases.

Several mechanisms might be implicated in the findings. Those who delay entering either kindergarten or grade one lose some of their friends who are going to school and become involved with younger, perhaps less competitive peer groups. When they do enter school, a similar pattern prevails. Because of their greater physical maturity and school readiness, the older children receive little competition or challenge from the younger members of the class. Perhaps more significant, they probably also receive less attention from the teacher who is likely to expect more from older children and be more concerned with the needs of the younger pupils. Thus, it is possible that for older children the restrictions on opportunities for growth resulting from late school entrance occur both before and after the child enters school. Children who enter school at a young age, leave the home environment before becoming bored with it and enter the school where they are forced to compete with a more physically and mentally mature group of classmates. It is possible that children unable to compete with older peers will be forced to seek teacher approval as their only means of positive reinforcement.

The Sex x Age interaction in the two subsamples results largely from the less prominent age trend for girls as compared to boys. In several

cases girls who entered young scored lower than did their older classmates—a reverse trend to that observed for boys. In any case, the trends for females are on the whole less obvious than that for males. It is unclear whether these results are artifacts of this particular sample or are produced by legitimate, though yet unexplainable, effects.

In interpreting the results we must stress that causality has not been established. An examination of the cell sizes for the various samples implies that there are fewer children born in the fall and winter months than in spring and summer. It is possible that the more intelligent parents plan the births of their children for these warmer times of the year and that the results are biased for this reason. The effects of season of birth, though unclear, are also not to be underestimated. In cold climates, children born in spring will receive outdoor stimulation more frequently in their first months of life than will those born during fall and winter.

Returning to the hypotheses, while the main age effect supported the hypothesis of higher scores for youngest entrants, the effect was not related to the level of SES of the sample; thus the other hypothesis was not supported. It is noteworthy that the main effect of SES is extremely strong. Recalling that SES as measured here is a school variable, the tendency for school SES to be related to the mental ability of pupils is not surprising. Whether individual measures of parental SES would reveal a significant SES x Age interaction remains to be investigated.

In conclusion, the findings suggest a relationship between age of school entrance and I.Q. in the fourth grade both for children who entered kindergarten and for those entering directly into grade one. There is a need to further replicate the study using older subjects to determine whether the relationship stands up over increased lengths of time. Most important, however, is the need for tightly controlled experimental studies which would provide differential treatments for different groups of children. Also, steps could then be taken to assess the relative weights of preschool and school-related experience.

References

Barrett, H. E., & Kosh, H. L. The effect of nursery school training upon the mental test performance for a group of orphanage children. *Journal of Genetic Psychology,* 1930, *37,* 102-122.

Bellins, R. D. Mental and educational growth patterns in relation to school entrance age. Unpublished Doctoral Dissertation, Boston University, 1963.

Bereiter, C., & Engelmann, S. *Teaching disadvantaged children in the preschool.* Englewood Cliffs, New Jersey: Prentice-Hall, 1966.

Burwin, B. R., et al. An analysis of the relationship of school entrance age to mental age and school achievement in grades one, three, five and eight. Unpublished Doctoral Dissertation, Boston University, 1958.

Deutsch, M. *Institute for developmental studies: Annual report.* New York: New York Medical College, 1965.

Douglas, J., & Ross, J. The later educational progress and emotional adjustment of children who went to nursery schools or classes. *Educational Research,* 1964, *7,* 73-80.

Gill, M. P. Relationship between junior kindergarten experience and readiness. *Ontario Journal of Educational Research,* 1967, *10,* 57-65.

Goodenough, F. A preliminary report on the effects of nursery school training upon the intelligence test scores of young children. *Yearbook, National Society for Studies in Education,* 1928, *27, Part I,* 361-369.

Grey, S. W., & Klaus, R. A. The Early Training Project: An intervention study and how it grew. *Journal of School Psychology,* 1966, *4,* 15-20.

Grey, S. W., & Miller, J. D. Early experience and cognitive development. *Educational Research,* 1967, *37,* 474-493.

Hanrahan, J. P. Effects of early school entrance on intelligence. Montreal, McGill University, unpublished M.A. Thesis, 1970.

Horvarth, J. B. An analysis of the relationship of school entrance age to mental age and school achievement in grade one. Unpublished Doctoral Dissertation, Boston University, 1960.

Kirk, S. A. *Early education of the mentally retarded.* Urbana, Illinois: University of Illinois Press, 1958.

Lamke, T. A., & Nelson, M. J. *The Henmon-Nelson Tests of Mental Ability: Examiner's manual.* Boston: Houghton-Mifflin, 1957.

Langerak, R. Sex and school entrance age as factors related to certain skills in achievement. Doctoral Dissertation, University of Nebraska, Ann Arbor, Michigan: University Microfilms, 1960, No. 60-5564.

Nicholson, A. K. Background abilities related to reading success in first grade. Unpublished Doctoral Dissertation, Boston University, 1957.

Skeels, H. M., & Dye, H. B. A study of the effects of differential stimulation on mentally retarded children. *Proceedings of the American Association for Mental Deficiency,* 1939, *44,* 114-136.

Sprigle, H. A., Van de Riet, V., & Van de Riet, H. A sequential learning program for preschool children and an evaluation of its effectiveness with culturally disadvantaged children. Paper read at the American Educational Research Association, New York, March 1967.

Weikart, D. P. Preschool programs: Preliminary findings. *Journal of Special Education,* 1967, *1,* 163-181.

Wells, J. & Arthur, G. Effects of fosterhome placement on the intelligence ratings of children of feebleminded parents. *Mental Hygiene,* 1939, *23,* 277-285.

Wooley, H. T. The validity of standards of mental measurement in young children. *School and Society,* 1925, *21,* 476-482.

The Alberta Journal of Educational Research *Vol. XVIII, No. 1, March, 1972*

J. J. BERGEN
and
D. DEISEACH

Dimensions of the High School Student's Role

Six dimensions of role were identified in a study of the high school student's role as perceived by first-year education students. The sample tended to agree strongly with these dimensions as legitimate aspects of the high school student's role. Differences in attitude towards the role were found to be related to the type of school attended but not to such personal variables as sex, socio-economic background, or teacher education route. The importance of defining the role of the high school student is stressed as an initial step in attempting to find a more meaningful part in the school organization for the student. (Dr. Bergen is an Associate Professor and Mr. Deiseach is a doctoral student in the Department of Educational Administration at The University of Alberta.)

Social psychologists (McGregor, 1960; Argyris, 1964; Maslow, 1964) have identified the problem of providing for individual needs within the organization as a central issue in motivating the members of the organization. One possible solution lies in "job enlargement" (Schein, 1965, p. 32); that is, broadening a member's role in order to increase his motivation and his sense of identification with the work, and in order to satisfy his need for meaningful activity, autonomy, and self-fulfillment. The school is an organization and the student is one of its members. The student's needs, as these may be identified in part by examining his perception of his role, ought not to be overlooked.

Problem

It is useful to examine the role of the high school student and to discover organizational adjustments that would make his participation in the school more meaningful. Not to do so invites an increase in student alienation, which is characterized by a sense of powerlessness to influence his situation in school, a loss of meaning in which the relevance of schoolwork is questioned, and a sense of isolation from the larger

society within the peer-group (Blauner, 1964). These symptoms can be recognized in the descriptions by commentators on the social condition of the high school student (Friedenberg, 1965; Grambs, 1965). Evidence from the Canadian scene on student disenchantment can be found in Scragg's (1968) investigation of the dropout in Alberta, and Friesen's (1967) identification of the potential dropout—one who would leave school if given the opportunity. Recent literature on student unrest advocates a more active role for the high school student, a share in the administrative decisions of the school and a greater measure of freedom and responsibility for learning.

Before any role enlargement decisions can be taken, however, a description of the high school student's role must be found. This was done for the present study (Deiseach, 1969) by asking 110 first-year education students to respond to an instrument containing a list of statements concerning the student's role. The sample was confined to those students who completed high school in the previous year since recency of high school experience was considered to be important. The problem was expressed operationally in the following questions: (1) What were the dimensions of the high school student's role as described by first-year education students?; (2) What was the extent of their agreement on these dimensions?; and (3) What differences in the perception of these dimendions were discernible when the respondents were compared on personal and social variables, and on characteristics of the high school they had attended?

Design of Study

A questionnaire entitled *The Role of the High School Student*[1] was used to elicit the perceptions of the student's role from the respondents. This was an attitude inventory of the Likert type consisting of fifty-two items in which the respondents were asked to indicate their relative agreement with each by circling the appropriate number on a seven point agree-disagree continuum. The items were normative statements, based on a review of literature and the experience of administrators, and were related to student behavior and attitudes in areas such as: school rules and regulations; school program; staff-student relations; peer-group relations; and, student participation in decision-making. The following is an example:

> You think or feel the high school student ought . . .
> to feel free to boycott classes 1 2 3 4 5 6 7

A pilot study was carried out with the initial version of the instrument and the Kuder-Richardson (KR 20) formula was used to measure the scalability of the items on both forms of the questionnaire as a test of internal consistency (Ferguson, 1966, pp. 379-380). Item analysis of the responses yielded KR 20 reliability coefficients of 0.52 for the pilot study, and 0.69 for the present study.

---

[1] This instrument was compiled initially by J. J. Bergen, in collaboration with D. Friesen and C. S. Bumbarger, at The University of Alberta. The revised edition which was used in this study was the work of J. J. Bergen and D. Deiseach.

Information on the respondent's background was solicited through an individual data sheet in the following categories: sex, teacher preparation route (elementary or secondary), socio-economic standing, organizational structure of the high school attended (Grades I-XII, junior-senior high, or high school), type of school (public or non-public), size of the school (number of high school teachers), and location of the high school (urban, town, or country). For each of the seven categories, a null hypothesis of no significant difference between student's perceptions of the high school student's role was formulated, e.g., "There is no significant difference between students who attended urban, town, and country high schools in their perceptions of the high school student's role."

In the treatment of the data, factor analysis with Kaiser's varimax method (Harman, 1967, pp. 301-308) was used to resolve the fifty-two items of the principal instrument into a small number of factors or dimensions in order to obtain a parsimonious description of the student's role. Two criteria were used to decide the appropriate number of factors. The first criterion was to choose the number of factors beyond which a break occurred in the eigenvalue curve (Horn, 1965; Linn, 1968). The second criterion was to select the largest number of factors which lent themselves to a meaningful interpretation (Kelley, 1940). Six factors were found to provide a description of the high school student's role as perceived by beginning education students. Factor scores were found by calculating the average of a respondent's scores across the items associated with each factor. A low factor score indicated agreement with the student behavior and attributes in a factor. The one-way analysis of variance technique was applied to these factor scores to test the hypotheses in the study. When three or more groups were compared, the Scheffé multiple comparison of means test was employed (Ferguson, 1966) to locate the groups between which the significant differences lay.

Findings

The six dimensions were given what was thought to be appropriate titles. They are described here in terms of the items to which they relate.

Student Conformity. Items associated with this factor described the attitudes of a student who was inclined to cooperate with the school administration, to adhere to convention, and to conform to school rules and regulations. He was disposed to please others, to try to be accepted by them, and to behave in ways that anticipated the approval of his superiors. He was opposed to behavior he deemed to exceed the bounds of propriety, or that evaded school rules.

Student Participation. Items in this factor related to student participation in the administration of the school and representation in making decisions affecting many aspects of school government. The student who tended to agree strongly with these items desired a voice in determining certain features of the curriculum program that controlled his progress through school. Another ingredient of this disposition was a belief in the right of students to challenge existing values and to use group tactics as a means of expressing student opinion.

Student Criticism. Strong agreement with this factor emphasized the

individual student's right to express criticism of institutional policies and practices. Attitudes that manifested an individual sense of responsibility and intellectual forthrightness were prevelant. A student so disposed appeared to be concerned that the school organization did not hinder his scholastic progress and that the quality of the learning experiences were not impoverished by dull routine.

Student Challenge. Strong agreement with the items of this factor suggested a greater emphasis on the rights of students to challenge the existing order. Students sought to place the student body on an equal footing with staff members. On the other hand, there was a relative lack of emphasis on individual responsibility and on intellectual independence.

Individual Quest. Items in this factor related to attitudes that might have been ascribed to a student who was concerned that the school serve him adequately as an individual seeker of knowledge. Learning as an inquiry process was stressed, and the freedom to engage in the corresponding activity within the school organization was sought.

Student Socializing. Agreement with items in this factor suggested being involved in social activities with students and staff. Group involvement in this case seemed to have been hedonistic and uncritical, rather than purposeful in the political sense.

A frequency distribution of factor scores for the six dimensions of the high school student's role is shown in Table 1. The preponderance of scores fell in the agreement end of the continuum for the first five factors, and to a lesser extent for the sixth. The inference drawn from this was that the sample showed some form of consensus on what they felt the role of the high school student ought to be, and that the six factors found in the study were perceived as legitimate dimensions of that role. That the respondents should have shown agreement with two apparently contradictory aspects of the student's role, Student Conformity and Student Challenge, indicated that the role was regarded as flexible—there was a time to conform and a time to dissent.

No significant differences were found in factor scores for the six dimensions of the high school student's role between first-year education students classified on the basis of sex, teacher preparation route, and socio-economic status. The first three hypotheses were, therefore, accepted.

Some significant differences in perceptions, as indicated by factor scores, were found among respondents based on three variables of the high school from which they graduated, size, type, and location. these were as follows: (1) students from private and separate schools showed more agreement with the dimension of Student Socializing than did students from public schools; (2) students from small high schools of ten or fewer teachers showed more agreement with Student Socializing than did students from large high schools of more than thirty teachers; (3) students from city schools showed more agreement with Student Criticism, Student Challenge, and Individual Quest than did students from town schools; and (4) students from rural schools showed more agreement with Student Socializing than did students from city schools. No significant differences were found for the remaining variable, type of high school organization. Thus, only the hypothesis of no significant differences in

TABLE 1

FREQUENCY DISTRIBUTION OF FACTOR SCORES FOR SIX FACTORS OF THE HIGH SCHOOL STUDENT'S ROLE (N = 110)

Factors	Agree Very Strongly (1)* 0.5-1.5	Agree Strongly (2) 1.5-2.5	Agree Somewhat (3) 2.5-3.5	Undecided (4) 3.5-4.5	Disagree Somewhat (5) 4.5-5.5	Disagree Strongly (6) 5.5-6.5	Disagree Very Strongly (7) 6.5-7.5	Means	Standard Deviations
I Student Conformity	15	69	24	1	1	0	0	2.13	0.68
II Student Participation	9	34	58	7	2	0	0	2.63	0.80
III Student Criticism	30	66	14	0	0	0	0	1.85	0.62
IV Student Challenge	2	30	57	21	0	0	0	2.88	0.73
V Individual Quest	1	32	57	20	0	0	0	2.87	0.71
VI Student Socializing	0	9	42	54	4	0	1	3.52	0.77

*Class interval = 0.5-1.5, midpoint of interval = 1, exact limits of interval = 0.5-1.49.

perceptions of the role of the high school student between first-year education students from high schools of different organizational type was accepted.

Discussion

Differences in attitudes towards the role of the high school student among first-year education students were found to be related to the kind of high school attended, but not to the personal variables of sex, teacher education route, and socio-economic standing. These findings differ from those of previous research (MacLean, Gowan, and Gowan, 1955; Ratsoy, 1965) where attitudes of first-year education students were examined. MacLean, Gowan, and Gowan found attitudinal differences among male and female students on theoretical, political, social, aesthetic, economic, and religious orientation variables. Ratsoy found differences among students classified by sex, teacher education route, and socio-economic stand-

ing on theoretical orientation, professional orientation, and aestheticism. The disaccord was probably due to the subject of inquiry in each case: the studies mentioned were addressed to general variables, and "the differences noted could be simply a reflection of broad culturally based sex differences that one would expect to find in any occupational group (Ratsoy, 1965, p. 116)"; this study, however, was concerned with a specific issue, the role of the high school student. Further research on attitude differences among first-year education students categorized by personal variables may not be fruitful when it deals with a limited topic such as this one.

Perceptions of the high school student's role held by first-year education students may depend principally on their own experiences in high school. In this respect, there are important differences between high schools: students who graduated from city schools showed more agreement with Student Criticism, Student Challenge, and Individual Quest, than did students from town schools. This suggests that students of a city school may be more aware of their political role than their counterparts in town schools are. Alternatively, students who attended a small rural high school were more likely to register a strong agreement with Student Socializing than students from a large city school. Evidently, it may be easier to achieve a more acceptable climate in a small school than in a large school by improving the extent of social involvement and staff-student relationships.

These findings have a special significance for principals and teachers. The quality of a student's experiences in the high school affects his later expectations for the high school student's role in the school organization when he becomes a teacher. A case could be made that innovations which tend to enlarge the student's role have a lasting effect and help to prepare future teachers to accept a broader interpretation of the high school student's membership in the organization. As a guide to discovering methods by which the student's role might be enhanced, the six dimensions found in this study deserve special attention. What arrangements can be made, for instance, to accommodate the Individual Quest dimension in the school organization? Consideration ought to be given to freedom for individual study during the school day, to the extent to which class attendance should be obligatory, and to adequate time for teachers to act as advisors to students. The dimension of Student Participation implies that structures be instituted through which students can have a real say in decisions which affect them. Student Criticism and Student Challenge dimensions indicate the desirability of a positive attitude towards student opinion and a constructive utilization of student ideas. The Student Socializing dimension points to the contribution which joint staff-student activities can provide to make students feel accepted in the organization. An analysis of these dimensions in the context of a particular school may encourage the principal and his staff to extend the student's participation in the organization.

References

Argyris, C. Human behavior in organizations. *Modern organization theory,* Mason Haire, editor, New York: John Wiley and Sons Inc., 1961.

Blauner, R. *Alienation and freedom.* Chicago: University of Chicago Press, 1964.

Deiseach, D. Beginning education students' perceptions of the role of the high school student. Unpublished masters thesis, The University of Alberta, Edmonton, 1969.

Ferguson, G. A. *Statistical analysis in psychology and education.* New York: McGraw-Hill Book Company, 1966.

Friedenberg, E. G. *The dignity of youth and other atavisms.* Boston: Beason Press, 1965.

Friesen, D. Profile of the potential dropout. *Alberta Journal of Educational Research,* 1967, *13,* 299-310.

Grambs, J. D. *Schools, scholars, and society.* New Jersey: Prentice-Hall Inc., 1965.

Harman, H. H. *Modern factor analysis.* Chicago: University of Chicago Press, 1967.

Horn, J. L. A rationale and test for the number of factors in factor analysis. *Psychometrika,* 1965, *30,* 179-186.

Kelley, T. L. Comment on Wilson and Worcester's "Note on factor analysis". *Psychometrika,* 1940, *5,* 17-20.

Linn, R. L. A Monte Carlo approach to the number of factors in factor analysis. *Psychometrika,* 1968, *33,* 37-71.

Maslow, A. H. *Motivation and personality.* New York: Harper and Bros., 1964.

MacLean, M. S., Gowan, M. S., and Gowan, J. S. A teacher selection and counselling service. *The Journal of Educational Research,* 1955, *38,* 669-677.

McGregor, D. *The human side of enterprise.* New York: McGraw-Hill, 1960.

Ratsoy, E. W. A comparative and cross-sectional study of attitudes of prospective teachers. Unpublished doctoral dissertation, The University of Alberta, Edmonton, 1965.

Schein, E. H. *Organizational psychology.* Englewood Cliffs, N. J.: Prentice-Hall, 1965.

Scragg, E. S. A survey of dropouts from Alberta schools, 1963-1968. Unpublished masters thesis, The University of Alberta, Edmonton, 1968.

The Alberta Journal of Educational Research *Vol. XVIII, No. 1, March, 1972*

D. B. BLACK
and
W. E. GODING

An Experiment in Classroom Management

Fourteen graduate student instructors who were responsible for conducting class discussions after televised lectures in an introductory general psychology course were divided into two equal groups. One group participated in a series of group process workshops; the other group attended no meetings other than those normal to the operation of the course. Students in the classes of these two groups of instructors were designated as experimental and control groups, respectively. It was hypothesized that classes with the advantage of instructors adept in interpersonal communication techniques would show learning gains significantly greater than would comparable classes taught without the benefit of such techniques. No statistically significant differences were found between experimental and control groups on either academic achievement scores or generally on three affective domain scale measures of reticence, anxiety, and dogmatism. (Dr. Black is a Professor of Educational Psychology and Dr. Goding is an Associate Professor of Curriculum and Instruction in the Faculty of Education at The University of Calgary.)

Criticisms that communication is essentially a one-way process are heard frequently today. Among the youth, the demand for dialogue appears to be critical to their current quest for relevant involvement with those in power. This growing demand can be detected across institutions—home, church, government, school. In their desires for more active participation in the classroom, the young see two-way communication as essential.

Yet, for all its apparent newness, the study of communication processes has been an educational research concern for many years. One need only refer to the classic network studies of Bavelas (1950), Leavitt (1951) and Shaw (1964), or to the earlier Lewin, Lippitt and White leadership studies (1939) for evidence of such concern. Characteristically, in these particular studies and in those considering authoritarian versus democratic or pupil-oriented leader (or teacher) configurations, the criterion most frequently has been task output of some kind. While attention has been given

to the changing of attitudes (affective domain), primary emphasis has been on production (cognitive output). Today's emphasis on communication focuses on improving the quality of interpersonal relationships as a primary goal. Certainly, the task or cognitive aspect of society remains vital if that society is to be maintained. Keltner (1970) neatly sums the contemporary approach to cognitive-affective interrelationships as follows:

> As we talk together, we will *make decisions* about each other; we will *solve problems* of one kind or another; and we will *anticipate future action,* either together or apart. (p.3)

Gage (1966), on this matter of the cognitive versus the affective, suggests that most of the literature research on teaching is not cognitively oriented but has been aimed at social and emotional aspects of how teachers behave and how students respond and develop. In retrospect, it is largely since the advent of programmed and computer-assisted instruction that task output has regained dominant status as a primary objective if for no other reason than that it can be empirically defined with reasonable reliability. McKeachie (1954) had earlier summarized the present research position in this way:

> In short, the choice of instructor-dominated versus student-centered discussion techniques appears to depend upon one's goals. The more highly one values outcomes going beyond acquisition of knowledge, the more likely that student-centered methods will be preferred. (p. 150)

For all this, task output remains critical to the classroom—an aspect which the public and, to a lesser extent, the pupils themselves expect of our schools. Therefore, if improved dialogue can facilitate efficient acquisition of these tasks, its expanded use in the classroom is to be encouraged.

A search of the literature reveals that much of the work has been incorporated within studies having another focus. Consider the case of Smith (1966) discussing a series of in-house studies involving, among other things, the role of discussion in teaching university psychology classes:

> In the first study, we were surprised to find that participants in class discussions, even when discussion was strongly encouraged, were nonconformists. They were also better informed than nonparticipants about psychology at the beginning of the course, but did not seem to benefit from their participation (Smith and Dunbar, 1951). In a second study, we were surprised to find that students did not particularly care for or benefit from classes run along democratic lines (Johnson and Smith, 1953). In a third study, we were surprised to find that whether students had favorable or unfavorable attitudes toward their psychology teacher and class activities had no relation to how much they learned during the course. Their attitudes toward the university they were attending and toward the importance of being students, however, did (Armour, 1954). In a fourth study, we were surprised to find that those who were most enthusiastic about their participation is small discussion teams learned the least from them. (p. 201)

In comparing recitation, tutorial, and discussion teaching techniques, Guetzkow, *et al.* (1954) found the autocratic recitation method produced superior performance on final examinations and a greater interest in the discipline, namely, psychology. Studies in the same series were reported

by Bovard (1951a, 1951b) and McKeachie (1951a, 1951b). Given effective responsibility for group decisions regarding content, conduct and evaluation of the course, the students spent most of the class time in decision-making discussion. Not withstanding this in attention to course content *per se,* there was no significant difference in examination scores from those of the control groups. In a well known study, Bellack, *et al.* (1963) examined the relationship of teaching styles to the discourse of the classroom, also assessing the amount of learning that occurred. They found that the amount of learning for a topic was not related to the amount of discussion given to that topic.

Perhaps the most relevant investigation to the present concern was a pilot study reported by Flickinger, Hunt and Bradley (1967). They attempted to demonstrate the effect of permitting students to deal openly with their peers about their attitudes and feelings. They hypothesized that this would produce "marked improvement" in course performances in engineering freshman mathematics. Although the sample was small in both the experimental and control groups (N=7), they concluded that the performance of the experimental group was significantly better than that of the control group, but they could not confirm any improvement in motivation. The subjects were not informed of the criterion until after the study, and although they statistically did not show motivational differences, the experimental group expressed personal satisfaction with the training sessions that could only be classified as most satisfactory. Along the same line, both Lewin (1952) and Kostick (1957) report the use of group discussion to improve aspirations for better course grades.

Although concerned with the elementary school, two studies by Aspy (1967a, 1967b) are relevant to the present investigation. The purpose was to demonstrate relationships between degrees of teacher facilitative behavior and learning in a third grade class as measured by the Stanford Achievement Test. He found that students of facilitative teachers showed significant gains on four of the five subtests (no significance on the Spelling subtest). In his second study, he reported performance gains for students of high facilitative teachers far in excess of those with teachers functioning at a low facilitative level. In addition, students in the low facilitative situation showed significantly greater levels of truancy.

While these studies do not represent an exhaustive review of the literature, they do illustrate the contention that though research has been done in the area, many of the pertinent findings are incidental to studies with a different focus. The reader interested in college teaching in particular, is referred to McKeachie's excellent chapter in the *Handbook of Research on Teaching* (1963).

The Hypothesis

The main hypothesis for the study was developed on an apriori basis as follows. Learning research tells us that the individual learns only to the extent that he is involved in the process. While there is some argument about covertness versus overtness, learning is still an individual thing whether this be the learning of content or the changing of attitudes. Involvement takes place largely to the extent that the individual is "comfortable" with himself and with the group of which he is a member.

Learning also seems to take place best under conditions of mild stress—too much or too little is disruptive. Thus, the degree of involvement will be reflected in the degree of freedom from interpersonal anxiety and in the ability of the group to deal with content matter under discussion. For example, if one feels confortable in the group he will not be afraid to speak out—to take risks—for fear of "making a fool of himself." With anxiety from group interaction reduced, discussion of content should become more "open" for free learning. Although the kind of learning task is a vital factor, the research literature provides support for the idea that improved learning occurs in group situations. In general, it was hypothesized that students who have had opportunity to establish better peer relations in the learning group will achieve better as a group than will those not provided such opportunity. If one were to arrange classroom management to first establish better lines of interpersonal communication and then proceed within this rubric to content learning, the learning gains of such classes would be greater than for those not given this opportunity.

Specifically, the hypothesis struck was that those classes with the advantage of instructors adept in interpersonal communication techniques would show learning gains significantly greater than would comparable classes taught without benefit of such techniques.

Design

The sample of the study (N=303) consisted of all students registered in the 1970 Fall Term (13 weeks) of Educational Psychology 211 at the University and who "survived" to write the third assessment test on December 10. This is a freshman course introducing general psychology with an educational emphasis. It was offered on a Tuesday-Thursday sequence in 75-minute periods at 9:30 a.m. and 11:00 a.m. The general format was a televised lecture presentation of about 45 minutes followed by a discussion seminar. Course enrollment was divided originally into sixteen sections, random student assignment within the two offered times was carried out by computer sectioning in the Registrar's Office. The principle of randomness between offered times was confined to the extent of the student's obtaining a workable timetable. Administrative necessity reduced the number of sections to fourteen, seven in each time slot. Students in the two cancelled classes and late arrivals were randomly assigned to other sections in numbers to make each section's size approximately equal. This resulted in section sizes of about 25 each for the seven 9:30 a.m. classes and about three less for the 11:00 a.m. classes.

Each section was assigned a graduate student instructor whose responsibility was to conduct class discussion after the TV lecture. To avoid "remoteness", the TV lecturers visited each class throughout the course on a cycled sequence. In addition to three assessment periods in the term, there were three periods with no TV lecture which were available to the instructor and the class to do with as they wished.

Students were given a choice of formats for the first two assessments. These consisted of multiple-choice, essay or short answer item tests. The third assessment, common to all students, was a 90-item multiple-choice test with a KR 20 reliability of .82. This test was also used as an anchor

to articulate marks for the different assessment pattern choices, although with one exception, this was not necessary. Test content was based on both the TV lectures and text materials. All items were screened and approved by TV lecturers for the assessment period in question.

The study was so planned that it would not prejudice the student because of his individual involvement—or lack of it. This involved "treating" the fourteen section instructors[1] rather than the classes themselves. The participating instructors, all graduate students, were paired on the basis of teaching experience, Faculty of undergraduate degree, age, and sex. Primary emphasis was placed on the teaching experience characteristic. Six pairs resulted with three conditions of teaching experience: those without prior teaching experience, those with teaching experience in the schools (pairing here attempted to match years of teaching experience as well), and finally, those who had taught the course the previous year. This resulted in two pairs assigned to each of the three teaching conditions. For each condition pair, one pair was assigned at random to the 9:30 or 11:00 a.m. class, and one from each pair randomly to the experimental group. A further feature assigned the same classrooms to opposite experimental conditions between class times for each pair. This assignment left two sections for use as spares in the event that something happened to a pair member within the design proper. (As it turned out, such reassignment was unnecessary.) The pair assignments and number of students by section is given in Table 1.

TABLE 1

CLASS/SECTION ENROLLMENTS AS OF DECEMBER 15 AND WRITING THIRD ASSESSMENT TEST AS ASSIGNED TO CONTROL AND EXPERIMENTAL GROUPS BY TIME AND INSTRUCTOR PAIRING CONDITION

Section Instructor Condition	Pair No.	Experimental Condition				Total	
		Control Group		Experimental Group			
		Time of Class		Time of Class		Experimental Condition	
		9:30	11:00	9:30	11:00	Control	Experimental
I. No Previous Teaching Experience	1	23		22			
	2		21		20	44	42
II. Teaching Experience in Schools	3	21		24			
	4		20		26	41	50
	Spare				21		21
III. Taught Course Last Year	5	22		21		45	38
	6		23		17		
	Spare	22				22	
Total (Pairs Only)		66	64	67	63	130	130
TOTAL		85	64	67	81	152	151

[1] The authors would like to acknowledge with great appreciation the contribution of the following people, not only to this study but to the course itself: Miss Heather Bulmer, Mrs. Kathleen V. Cairns, Miss Judith A. Campbell, Miss Dana McLaren, Mr. F. Patrick Clarke, Mr. Robert D. Desjardins, Mr. Stanley A. Engel, Mr. Sheldon L. Maerov, Mr. Heinz J. Moller, Mr. Maurice Nakoneshny, Mr. Gregory J. Rudloff, Mr. Thomas A. Stott, Mr. Gary Stromsmoe, and Mr. Jack Tarasoff.

The "treatment" of the experimental group (X group) proceeded as follows. The seven X group and seven control group (C group) instructors were given adjoining offices but on opposite sides of the building with the intention of minimizing interchange between groups. It was also intended to provide new instructors easy access to experienced colleagues within each X or C group. A series of weekly two-hour group process workshops were conducted by one of the authors (Goding) to differentiate the X group from the C group. These sessions were concerned with the understanding and employment of communication techniques intended to facilitate member participation and more "open" discussion of course content in small groups. The X group discussed group process theory and procedures, participated in exercises designed to illustrate theoretical aspects, and evaluated its own efforts on a shared experience-and-advice basis. (It is interesting to note that the X group became very close, with further evidence that the C group would like to have become involved in the seminars. This was to have interesting effects as will be noted later.) For the C group, nothing was done other than through regular meetings of all instructors and lecturers normal to the overall operation of the course. All students were advised initially that a study was being conducted but they were not told the group to which their instructor had been assigned nor the form of the study.

The primary criterion of the study was each section's performance on a multiple-choice test. Two additional measures in the affective domain were employed. The first is a scale used routinely by the Faculty Speech Division to detect potential speech problems among incoming students. It consists of items from a Reticence Scale (R) and an abbreviated Taylor Manifest Anxiety Scale (TA). The R Scale is an instrument developed by C. M. Phillips at Pennsylvania State University in 1965. It is, to the knowledge of our colleagues in the Speech Division, unpublished although it has been used in a number of theses and routinely as a screening device at several institutions. Its administration here as a post-test within the last ten days of the course constituted no major problem, and the information gained would be useful to both the present study and to the Speech Division. Of the 303 students in the study sample, only 177 wrote both pre- and post-tests.

The second affective domain test employed was the Dogmatism Scale (D) developed by Rokeach (1951, 1960). It, too, was used on a pre-/post-basis, with about two and one-half months between administrations. Only a partial sampling of the study population was obtained (215 of a possible 303).

An attempt was made to do a transactional analysis of the discussions, but equipment failure problems on the first sampling data necessitated cancellation of this phase of the study. In its place, one room was selected at random from the seven used in the course, and both the 9:30 and 11:00 a.m. classes held in that room were video-taped. This procedure provided both a control and experimental section.

Results

The most dramatic effect of the impact of the communication seminars could be obtained by entering classrooms after classes had been dis-

missed. In the C group sections, chairs remained in orderly rows in the traditional sense. In the X groups, however, chairs were about the room either in a large circle or in smaller groups. The willingness of the X group instructors to try discussion-encouraging techniques was further confirmed by the lecturers on visits to the rooms. Provision was made for (in several cases requested by students) cancellation of scheduled lecturer visits for a particular day. Finally, the televised X- and C-group discussions attested to the dramatic differences in the conduct of the two classes. It is to be emphasized that each class video-taped was superbly conducted —a credit to both the instructor and the students involved. The point is that the management techniques used in the two classes discussing the same topic differed dramatically. This point will be discussed later.

Since it was assumed that students had been assigned randomly to sections, analysis of data was made directly of the sections' performance on the criterion achievement test. Results of this analysis are reported in Table 2. None of the mean differences was found to be statistically significant at the 5% level of confidence. However, the direction of differences was interesting. Overall, the C group did better than the X group, and this was true of the No Experience, and the School Teaching Experience condition groups. In each case, the variances of the X groups were larger than those of the C groups. Finally, the pattern of means for the C and X groups was directly opposite, that is, in the C groups those with No Experience instructors scored highest while in the X groups, the reverse (and expected) situation was found.

This invited the development of new hypotheses, except for the growing suspicion that perhaps student section assignments were not random.

TABLE 2

MEANS AND STANDARD DEVIATION OF TEST CRITERION SCORES FOR CONTROL AND EXPERIMENTAL GROUPS
(Hypotheses: Mean X > C)

Section Instructor Condition	Experimental Condition	Raw Score of Test Criterion			Test of Hypothesis that mean of X C
		N	Mean	S. D	
I. No Previous Teaching Experience	C	44	57.93	8.92	Reject -(NSD)
	X	42	54.57	9.73	
II. Teaching Experience in Schools	C	42	56.67	7.41	Reject -(NSD)
	X	50	55.24	9.52	
III. Taught Course Last Year	C	45	55.53	8.38	Reject (NSD)
	X	38	56.11	9.88	
Total of Paired Sections	C	130	56.62	8.54	Reject -(NSD)
	X	130	55.28	9.70	
	Total	260	55.95	9.16	
Total Including Spare Sections	C	152	56.63	8.42	Reject -(NSD)
	X	151	55.25	9.65	
	Total	303	55.94	9.10	

Table 3 reports the admission qualifications of students by section. Also reported are the mean and standard deviations of the Grade XII Departmental admission averages of those students whose records included these. Two features of Table 3 should be noted. First, the admission average was higher for the C group than for the X group—significantly so at the 5% level for the No Experience instructor classes. Second, the number of non-matriculated adults (NMA) in the C group outnumbered those in the X group, 19:2. The case of the NMA student is well documented by in-house research and that reported by Vasalenak (1970). In brief, the NMA student is much less apt to fail or withdraw than is the normal incoming student. It is acknowledged, too, that they as a group are not among the very high standing students.

In light of this evidence there seemed little recourse than to do an analysis of covariance, using only those students for whom a high school admission average was available. A sample of fourteen eligible students was drawn at random from each of the twelve paired sections, and the method of analysis outlined by McNemar (1962, p.362-373) followed. It was found that there was a significant relationship between high school admission average and performance on the criterion test (r=.48). As reported in Table 4, when the means were adjusted, differences between C and X groups diminished markedly and the patterns of direction of differences within the C and X groups noted earlier disappeared.

TABLE 3

DISTRIBUTION OF ADMISSION QUALIFICATIONS BY CONTROL AND EXPERIMENTAL GROUPS AND INSTRUCTOR CONDITION

Section Instructor Condition	Experimental Condition	Admission Condition									Group Grade XII Admission Averages			
			Grade XII Average											
		N	Below Admission Average	60–64	65–69	70–74		CEEB/Early Admission*	Non-Matric Adult	** Miscellaneous	N	Mean	S.D	Test of Hypothesis that X = C
I. No Previous Teaching Experience	C	44	1	5	13	8	9	2	3	3	35	70.14	6.00	Reject (5%)
	X	42	1	19	6	4	7	1	1	3	37	66.54	6.59	
II. Teaching Experience in Schools	C	41	–	15	9	4	6	–	5	2	34	67.85	7.21	Accept (NSD)
	X	50	–	17	17	10	3	–	–	3	47	66.74	4.78	
III. Taught Course Last Year	C	45	1	15	8	6	5	1	7	2	34	66.91	6.27	Accept (NSD)
	X	38	–	8	8	11	1	3	1	6	28	68.09	4.98	
[illegible] Paired	C	130	2	35	30	18	20	3	15	7	103	68.32	6.62	Accept (NSD)
	X	130	1	44	31	25	11	4	2	12	112	67.01	5.48	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	17	19	215	67.64	6.06	
[illegible] Including	C	152	2	[illegible]	[illegible]	[illegible]	12	4	19	8	119	68.13	6.49	Accept (NSD)
	X	151	1	51	[illegible]	[illegible]	13	4	2	12	133	67.07	5.38	
	Total	303	3	92	[illegible]	[illegible]	35	8	21	20	252	67.57	5.96	

*Registrar's Office reports students admitted under this ruling usually have Departmental averages of 70 or higher.

**Includes transfer from community colleges (6), those with completed degrees (3), university level transfers (3), and high school admissions from other areas than Alberta or Saskatchewan.

TABLE 4

CONTROL AND CRITERION MEANS AND STANDARD DEVIATIONS OF A SAMPLE SELECTED AT RANDOM FROM STUDY POPULATION AND CRITERION MEANS CORRECTED AS A RESULT OF ANALYSIS OF COVARIANCE (r= .46)

Section Instructor Condition	Experimental Condition	Grade XII Departmental Admission Average			Criterion Scores: Third Assessment 90 M/C Item Test		
		N	Mean	S.D	Mean	Corrected Mean	S.D
I. No Previous Teaching Experience	C	28	70.21	6.14	58.50	56.77	8.71
	X	28	66.39	7.47	55.35	56.09	9.21
II. Teaching Experience in Schools	C	28	67.57	6.54	56.21	56.20	8.48
	X	28	66.10	4.73	55.46	56.39	8.30
III. Taught Course Last Year	C	28	66.92	6.49	56.10	56.50	5.42
	X	28	68.07	4.98	56.21	55.87	8.97
Total of Paired Sections	C	84	68.24	6.48	56.94		8.59
	X	84	66.86	5.85	55.67		8.87
	Total	168	67.55	6.21	56.30		8.78

TABLE 5

MEANS* AND STANDARD DEVIATIONS* BY CONTROL AND EXPERIMENTAL CONDITION FOR PRE- AND POST-TEST SCORES ON THE PHILLIPS RETICENCE (R), ABBREVIATED TAYLOR MANIFEST ANXIETY AND ROKEACH DOGMATISM SCALES

Section Instructor Condition	Experimental Condition	Phillips Reticence (R) Scale			Abbreviated Taylor Manifest Anxiety (TA) Scale				Rokeach Dogmatism (D) Scale			
		N	Pre-T(I) M/S.D.	Post-T(I) M/S.D.	$R_{1.2}$	N	Pre-T(I) M/S.D.	Post-T(I) M/S.D.	$R_{1.2}$	N	Pre-T(I) M/S.D.	Post-T(I) M/S.D.	$R_{1.2}$
I. No Previous Teaching Experience	C	17	15.2/7.3	11.7/5.3	.77	17	8.8/4.4	8.7/3.2	.56	17	24.4/10..	24.9/..	.76
	X	30	15.2/7.4	13.5/7.8	.93	30	8.4/4.4	8.4/3.1	.64	29	24.7/10.1	27.1/7.5	.71
II. Teaching Experience in Schools	C	24	13.9/7.8	11.6/6..	.74	24	7.5/3.4	7.4/3.1	.67	23	21.6/7..	22.1/[illegible]	.73
	X	22	14.2/8.5	13.6/7.8	.90	22	8.3/3.4	8.8/3.9	.71	24	22.7/7.1	23.2/8..	.79
III. Taught Course Last Year	C	31	14.3/7.6	9.6/5.9	.58	31	8.2/3.4	8.0/3.9	.70	30	24.1/10.1	23.9/8.1	.84
	X	23	12.6/6.8	10.4/6.7	.57	23	8.0/3.4	8.0/3.1	.49	21	21.3/10.1	21.6/11.1	.68
Total of Paired Sections	C	72	14.4/7.6	11.2/7.1	.74	72	8.2/3.8	8.0/3.3	.68	70	23.4/10.3	23.6/8.3	.78
	X	75	14.3/7.7	12.6/7.3	.82	75	8.2/3.8	8.3/3.5	.61	74	23.1/10.1	24.1/8.3	.80
	T	147	14.4/7.6	11.9/7.2	.79	147	8.2/3.8	8.1/3.4	.66	144	23.2/10.2	23.8/8.3	.79
Total Including Spare Sections	C	87	14.3/7.7	11.2/6.1	.67	87	8.2/3.8	8.1/3.2	.66	85	24.0/10.3	23.5/8.0	.80
	X	90	14.6/8.0	12.4/7.1	.72	90	8.2/3.8	8.1/3.2	.63	87	23.7/10.1	24.0/8.0	.66
	T	177	14.4/7.9	11.8/6.7	.75	177	8.2/3.8	8.1/3.2	.64	172	23.8/10.2	23.8/8.0	.73

*All means and standard deviations rounded to one decimal place. All statistical tests based on two.

**All means less 100.

These data clearly reject the hypothesis that increased facilitation of discussion, with the implied associated psychological benefits, would result in higher scores on the criterion achievement test. It is also important to note that the techniques used by the X group instructors, while not producing statistically significant improvements in learning, did not act to the detriment of the students.

If the techniques of classroom management aimed at improving communication did not improve achievement, did they have any effect in the affective domain? Three measures, as noted before, were used: the Reticence Scale (R), the Abbreviated Taylor Manifest Anxiety Scale (TA), and the Rokeach Dogmatism Scale (D). The investigators were interested in the extent to which the scores had been reduced between pre- and post-testing on all three variables for each individual as well as the differences between means. The correlations for the total sample between pre- and post-testings for the R, TA, and D scales were .78, 64, and .72, respectively. The means and standard deviations for pre- and post-test scores on each scale appear in Table 5. Although they are not reported, the means and standard deviations for the differences in scores from pre- to post-testing were calculated for all three scales. Table 6 summarizes the findings from the testing of four hypotheses: the equivalence of pre-test scores between X and C groups; a "positive" change from pre- to post-test scores for all groups; post-test scores would show less anxiety, reticence, and dogmatism in the X group; and the least change in scores

TABLE 6

SUMMARY OF HYPOTHESIS TESTING USING PRE- AND POST-TEST AND DIFFERENCE SCORES FOR THE RETICENCE, ANXIETY, AND DOGMATISM SCALES BY INSTRUCTOR AND EXPERIMENTAL CONDITION

Section Instructor Condition	Experimental Condition	Reticence Scale				Anxiety Scale				Dogmatism Scale			
		Hypothesis				Hypothesis				Hypothesis			
		$C_1=X_1$	$T_1>T_2$	$C_2>X_2$	$X_D>C_D$	$C_1=X_1$	$T_1>T_2$	$C_2>X_2$	$X_D>C_D$	$C_1=X_1$	$T_1>T_2$	$C_2>X_2$	$X_D>C_D$
I. No Previous Teaching Experience	C	A	A	R	R	A	R	R	R	R	R	R*	R
	X		A				R				R		
II. Teaching Experience in Schools	C	A	R	R	R	A	R	R*	R*	A	R	R	R
	X		R				R*				R		
III. Taught Course Last Year	C	A	A	R	R*	A	R	R	R	A	R	R	R
	X		R				R				R		
Total of Paired Sections	C	A	A	R	R*	A	R	R*	R	A	R	R	R
	X		A				R				R		
	T	–	A	–	–	–	R	–	–	–	R	–	–
Total Including Spare Sections	C	A	A	R	R	A	R	R*	R	A	R*	R	R
	X		A				R				R		
	T	–	A	–	–	–	R	–	–	–	R	–	–

Legend: A—Hypothesis accepted at 5% confidence level or better.
R—Hypothesis rejected.
*—Converse Hypothesis would be accepted at $p \leq .05$.

from the pre- to post-testing would occur in the C groups. The conventional "t" test was used throughout. The acceptable confidence limit for any difference found was 5%.

The results revealed that for all instructor conditions and combined conditions, with one exception, no statistically significant differences were found between pre-test means on all three scales. The exception was for the D scale and No Previous Experience group, where the X group mean score was significantly higher than that of the C group.

Differences between each student's performance on pre- and post-test scores, as well as post-test score differences between X and C groups necessitated rejection of the hypothesis that X group students, individually and collectively, would score significantly lower than would their counterparts. In every instance for the three scales employed, differences were found to be either in the wrong direction to that hypothesized or as not having statistical significance.

The failure to show no statistically significant differences between pre-test scores for the C and X groups on the D scale necessitated following the same analysis of covariance design as before, but using pre-test scores as the controlling variable and differences between pre- and post-testing scores as the criterion. Twenty-three students were selected at random for each instructor condition and the analysis conducted on this sample. In short, no statistically significant relationship was found between the pre-test and difference scores which would account for any differences found. When the corrected means were examined, only those means of the paired instructors who had taught the course the preceding year differed significantly from each other. This particular difference showed increased D scores for the X group, thereby causing the hypothesis to be rejected out of hand.

The comparison of pre- and post-test score means requires special attention. It was hypothesized that the very content of the course, regardless of X or C group treatments, should result in lower R, TA, and D scores. Only the R scale scores show much difference, and then only when the standard error of the difference between means is corrected for the correlation between the pre- and post-test scores. For this scale, even when differences were not statistically significant, all were in the hypothesized direction. For the TA and D scales, the change is a matter of progression in degrees. For the TA scale, some groups reported post-test means higher than the pre-test's, while other conditions reported the opposite. With one exception, no statistically significant differences were found between pre- and post-test score means. The one exception, the experimental Previous School Teaching Experience group, reported a significant increase in anxiety scores. The D scale results paint the opposite picture to that of the R scale. Here, post-test scores were higher than pre-test, with one exception, the experimental No Previous School Experience group. This one difference was not statistically significant.

From the above, accepting that the scales in each case measured what was claimed of them, it could be concluded that the course, Educational Psychology 211, had students who over the period of study: (a) showed no consistent change in anxiety levels, (b) who became less reticent, and (c) who became more dogmatic than when they began the course. Whether

this can be attributed exclusively to this particular course is a moot question but one worth further investigation.

Discussion

As a result of this study, a number of points should be considered. First, in the light of the contradictory evidence from the literature, a null hypothesis format would have been preferred. Second, the actual study conducted in an operational setting was subject to all the weaknesses associated therewith. For example, although there is no evidence of this, it may have been that the very size of the classes operated against the success of the experiment, i.e. the techniques used may function much better with much smaller groups. It was also very evident that the teaching styles within the experimental and control groups differed greatly. There was, for example, some evidence that some of the control group instructors wanted to and did use methods analagous to some used in the experimental group classes. It also could be that the criterion was not a valid assessment of cognitive learning in the course. The students themselves took a stance on this. Or it may be that the very concepts of interpersonal communication and task achievement are not compatible. For example, in an early study Deutsch (1949) found in contrast to a non-competitive group, the competitive group was more obstructive, aggressive and oppositional. (Like findings for groups with task-oriented goals are reported by Raven and Rietsema (1957), Bales (1958), and Della Piana and Gage (1955).) Task achievement implies competitiveness which acts against social dialogue.

Finally, one area of evaluation has been purposely neglected, the reactions of the students themselves. This was done for two reasons: First, feedback from the students via the instructors had been encouraged throughout the course. This was very direct. Therefore, any collection of such data would represent a distorted picture of the individual's attitude because of previous class discussions. Finally, the resistance to completion of forms not directly related to course content at the end of the course would ensure a completion ratio somewhat less than satisfactory. In its place, a debriefing of the course was held by Dr. W. R. Unruh, Head of the division of the Department responsible for the course. Students in each class elected one representative to meet with him. Two such group meetings were held, one with representatives from the control group; the other, from the experimental sections. Each was asked the same questions and discussions proceeded about each. It is not possible to meaningfully compare the two groups but the following reactions were brought forcibly home to the authors upon reviewing the tapes:

(1) the students of both groups were not hesitant to openly and bluntly criticize all aspects of the course, nor did they fail to offer many excellent suggestions on how the course might be improved;

(2) they were not uniformly enthused, to say the least, about TV teaching, the lecture content and some of the TV lectures and lecturers, in particular (See McKeachie, 1963, p. 1149, citing Lepere and Wilson, 1958; and Macomber and Siegel, 1960);

(3) they did speak with favor about the opportunity to discuss the topics and, within the context of the preceding point, asked for more and better discussion time and with a greater "provided content" basis;

(4) they were concerned with the format of the assessments throughout the term claiming that they did not truly assess the amount of learning in that period and particularly that of growth from the discussion; and finally,

(5) they were inconsistent within each group as to whether the aims and the objectives of the course had been made clear.

The general impression of the authors regarding the two groups was one of varying degrees of hostility (bluntness?) with the control group being clearly the most direct. Whether this was a result of the experimental conditions or simply the result of the classes' selection techniques in naming their representatives cannot be adequately answered.

In conclusion, for those hesitant to 'humanize' their classrooms for fear of losing quantitative gains, such concerns appear without basis in fact. Smith (1966) puts in this way, "Where sensitivity is viewed as the primary goal, student satisfaction and mastery of psychological knowledge can at least be as great as where satisfaction and mastery of inert ideas are viewed as primary goals (p. 203)." As Krathwohl, *et al.,* remark, mastery of content may be one thing but in the process of acquiring this content, aversion to a subject, e.g., literary works, may also occur (1964, p. 20). It remains that what a teacher does in the classroom should relate closely to his or her objectives. This study and the literature in general about classroom management and actual achievement suggest that indeed there is considerable latitude open to the teacher/instructor before significant learning losses become apparent.

References

Aspy, D. "The differential effects of high and low functioning teachers upon achievement," and "The effects of high and low functioning teachers upon student performance." Unpublished, University of Florida. As cited by P. R. Carkhuff and B. G. Bereson, *Beyond counselling and therapy.* New York: Holt, Rinehart and Winston, 1967, pp. 296-297.

Bales, R. F. Task roles and social roles in problem solving groups. In E. MacCory, *et al.* (Eds.), *Readings in social psychology, Third Edition.* New York: Holt, Rinehart, and Winston, 1958, pp. 437-447.

Bavelas, A. Communication patterns in task-oriented groups. *Journal of the Acoustical Society of America,* 1950, *22,* 735-730.

Bellack, A. A., Danitz, J. R., *et al., The language of the classroom: meanings communicated in high school teaching,* U.S. Department of Health, Education and Welfare, Office of Education. Cooperative Research Project No. 1487. New York: Institute of Psychological Research, Teachers College, Columbia University, 1963.

Bovard, E. W., Jr. The experimental production of interpersonal affect. *Journal of Abnormal Social Psychology,* 1951, *46,* 521-528.

Bovard, E. W., Jr. The psychology of classroom interaction. *Journal of Educational Research,* 1951, *45,* 215-224.

Della Piana, G. M., & Gage, N. L. Pupil's values and the validity of the Minnesota Teachers Attitude Inventory. *Journal of Educational Psychology,* 1955, *46,* 167-78.

Deutsch, M. An experimental study of the effects of cooperation and competition upon group process. *Human Relations,* 1949, *2,* 129-152.

Flickinger, C., Hunt, P., & Bradley, H. Some effects of human relations training on performance of freshmen engineering students in a beginning math course. Unpublished paper presented to Seminar in Group Process, Spring Quarter, University of Denver, 1967.

Gage, N. L. Research on cognitive aspects of teaching in *Report on the seminar on teaching: The way teaching is.* Washington: Association for Supervision and Curriculum Development and the Center for the Study of Instruction, National Education Association. 1966, pp. 29-44.

Guetzkow, H., Keely, E. L., & McKeachie, W. J. An experimental comparison of recitation, discussion, and tutorial methods in college teaching. *Journal of Educational Psychology,* 1954, *45,* 193-207.

Johnson, R. L., & Smith, H. C. Democratic leadership in the college classroom. *Psychological Monographs.* 1953, *62*(11).

Krathwohl, D. R., Bloom, B. S., & Masia, B. B. *Taxonomy of educational objectives: The classification of educational goals, Handbook II: Affective domain.* New York: David McKay Co., 1964.

Keltner, J. W. *Interpersonal speech-communication: Elements and structures.* Belmont, California: Wadsworth Publishing Company, 1970.

Kostick, M. M. An experiment in group decision. *Journal of Teacher Education,* 1957, *8,* 67-72.

Leavitt, H. J. Some effects of certain communication patterns on group performance. *Journal of Abnormal and Social Psychology,* 1951, *46,* 38-50.

Lewin, K. Group decision and social change. In *Readings in social psychology,* G. E. Swanson, *et al.* (Eds.), New York: Henry Holt, 1952, pp. 330-334.

Lewin, K., Lippit, R., & White, R. K. Patterns of aggressive behavior in experimentally created social climates. *Journal of Social Psychology,* 1939, *10,* 271-99.

McKeachie, W. J. A program for training teachers of psychology. *American Psychologist,* 1951, *6,* 119-121.

McKeachie, W. J. Anxiety in the college classroom. *Journal of Educational Research,* 1951, *45,* 153-160.

McKeachie, W. J. Student-centered vs. instructor-centered instruction. *Journal of Educational Psychology,* 1954, *29,* 143-150.

McKeachie, W. J. Students, groups, and teaching methods. *The American Psychologist,* 1958, *13,* 580-584.

McKeachie, W. J. Research in teaching at the college and university. In *Handbook of research in teaching,* N. L. Gage, (Ed.), Boston: Rand McNally & Co., 1963, pp. 1118-1172.

McNemar, Q. *Psychological statistics, Third Edition,* New York: John Wiley and Sons, 1962.

Raven, B. N., & Rietsema, J. The effects of varied clarity of group goal and group path upon the individual and his relation to his group. *Human Relations,* 1957, *10,* 29-45.

Rokeach, M. A method for studying individual differences in "Narrow-Mindedness", *Journal of Personality,* 1951, *20,* 219-223. (See also, *The open and closed mind,* New York: Basic Books, Inc., 1960.)

Shaw, M. E. Communication networks. In L. Berkowitz, (Ed.), *Advances in experimental social psychology, Vol. I.* New York: Academic Press, 1964, pp. 111-147.

Smith, H. C. *Sensitivity to people.* New York: McGraw-Hill Book Co., 1966.

Vaselenak, M. Admission of mature non-matriculated students into a degree program. *McGill Journal of Education,* (Spring, 1970), 85-96.

The Alberta Journal of Educational Research *Vol. XVIII, No. 1, March, 1972*

E. A. BLOWERS

Barriers to the Education of Children From Low Income Families

Opinions about why children from low income families frequently achieve poorly in school were investigated with samples of principals, teachers, and economically disadvantaged parents. Ten problem areas were examined, and the opinions of the three groups were compared statistically. Areas of disagreement between parent and school groups included difficulty perceived in purchasing school clothing and paying school costs. There was evidence that the parent sample did not realize the effect of their children's preschool and extracurricular experiences on the educational process. The differences of opinion in several problem areas indicate a need for more effective communication between teachers and economically disadvantaged parents. (Mrs. Blowers is a Sessional Instructor in the Department of Educational Psychology at The University of Alberta.)

Problem

While a great deal is known about the school achievement of economically disadvantaged children, there is little information on how disadvantaged parents perceive the school system. One of the few facts that appears clear is that low income parents would like to have their children complete high school and university, but surveys of parent opinion (Alberta, Executive Council, vols. 3 and 4, 1967; Mulligan, 1951) contain no information on the factors which parents see as working against the effective education of their children. The perceptions of school personnel of causes for low school achievement by children from low income homes seldom is examined.

This study was an investigation of the opinions of economically disadvantaged parents and school personnel concerning reasons why children of low income families achieve poorly in school. It also examined the areas in which the groups, composed of parents on welfare, teachers and school principals, disagree.

Method

Thirty families who received social assistance through the Edmonton City Social Service Department and who lived in districts throughout the city were interviewed. The sample of school administrators consisted of the principals of thirty of the schools attended by children of the parent sample. Thirty teachers were selected randomly from those serving in schools in the two census tracts identified as having the most problems generally associated with areas of low socio-economic status (Alberta Executive Council, vol. 2, 1967).

In a structured personal interview, each informant was asked if he considered the following conditions limited the educational opportunities of children of low income families. When a respondent indicated that he considered a particular condition constituted a problem, he was asked why that condition occurred and what might be done to alleviate it. The conditions were:

1. lack of parental interest in education;
2. lack of student interest in education;
3. inability of parents to provide suitable school clothing for children;
4. inability of parents to pay school costs promptly and without undue hardship;
5. ineffectiveness of teaching methods used;
6. unsuitability of school programs;
7. lack of parental information on aims and functions of the school;
8. lack of opportunity for students to cultivate special interests and talents;
9. difficulty in social acceptance of economically disadvantaged students by other students;
10. lack of preschool experiences useful as a basis for early school learning.

Results

Table 1 gives the number of subjects in each group who considered each of the above conditions as detrimental to the education of disadvantaged children.

TABLE 1

TOTAL NUMBER IN EACH GROUP PERCEIVING EACH AREA AS A PROBLEM

Problem Area	Parents (N = 30)	Principals (N = 30)	Teachers (N = 30)
1. Parental Interest	12	17	23
2. Student Interest	20	20	15
3. Clothing	27	13	13
4. School Costs	28	16	15
5. Teaching Methods	13	10	9
6. School Programs	8	10	17
7. Parental Information	14	21	26
8. Extracurricular Interests	14	25	23
9. Social Acceptance	11	15	9
10. Preschool Experience	6	24	22

As the data permit rank ordering only, the chi square nonparametric statistic was used. Table 2 indicates the significance of the difference of perception of each group in relation to each of the other two groups.

TABLE 2

LEVEL OF SIGNIFICANCE OF DISAGREEMENT BETWEEN GROUPS AS TO PRESENCE OF PROBLEMS IN EACH AREA ON CHI SQUARE TEST

Problem Area	Parent-Principal	Parent-Teacher	Principal-Teacher
1. Parental Interest	.20	.01	.20
2. Student Interest	1.00	.20	.20
3. Clothing	.001	.001	1.00
4. School Costs	.001	.001	.80
5. Teaching Methods	.50	.30	.70
6. School Programs	.70	.02	.10
7. Parental Information	.10	.01	.70
8. Extracurricular Interests	.01	.02	.70
9. Social Acceptance	.30	.70	.20
10. Preschool Experience	.001	.001	.70

Note—P is equal to or less than level indicated; df = 1.

It appears from this study that there are differences of perception among parents, principals, and teachers as to school problems of children of low income families. Parents and teachers differed in their perception of parental interest in education; this difference was statistically significant at the .01 level. Teachers in this sample perceived low income parents to be much less interested in their children's education than parents considered themselves to be. The reason most frequently given by school personnel for parental lack of interest was that low income parents were unable to understand the value of education for their children. The main reason given by parents was that long range educational plans were unrealistic, for students had to find full time employment as soon as possible.

Fewer teachers and principals than parents considered provision of school clothing as a problem. The difference in opinion was statistically significant at the .001 level. It appears that a majority of school personnel in this sample did not appreciate the difficulty for low income parents in making their children reasonably presentable for school.

Teachers and principals differed from parents on perceptions of the difficulty of paying school costs, which included textbook rentals and purchases, school supplies and miscellaneous fees. The difference in perception of this problem was significant at the .001 level. Nearly all families interviewed considered the payment of school costs to be extremely burdensome. Most parents said that teachers were understanding if told the money would be sent to school as soon as possible. Some parents reported retaliatory measures for late payment, including public scolding of children and exclusion from class until payments were made.

Differences in perception of the suitability of teaching methods were not statistically significant.

Teachers found more to criticize in school programs than did parents and principals, with the parent group showing least disapproval. Teachers and parents differed at the .02 level of significance on their perception of the suitability of school programs for economically disadvantaged children. Teachers were highly critical of the middle class bias of textbooks and other teaching materials and expressed a desire for materials which reflected the experiences of children from lower income neighbourhoods. Teachers and principals differed at the .01 level of significance in their perceptions of program suitability.

Parents generally considered themselves better informed on school affairs than they were thought to be by teachers and principals. These differences in attitudes were significant at the .01 and .10 levels respectively. School personnel perceived this lack of information generally as a function of parent disinterest, while parents tended to stress the difficulty of getting to school meetings, lack of communication from the school and inability to hire baby sitters.

Parents tended to consider their children's extracurricular interests more adequately developed than did principals or teachers. Parent-principal and parent-teacher opinions on this differed respectively at the .01 and .02 levels of significance.

There were no statistically significant differences of opinion between parents and school personnel on the question of social acceptance of students from low income families. Parents felt that appropriate clothing was most important in the acceptance of their children, while school personnel considered personal hygiene and social skills to be equally important.

Only six parents considered that the children of low income families start school at a disadvantage because of preschool experiences different to those of the children of more affluent families. The difference in perception between parents and school personnel on the need for special preschool programs for children of low income families was statistically significant at the .001 level.

Discussion

It is not possible to ascertain objectively the validity of the views expressed by the groups in this type of study. However, an examination of the areas showing statistically significant differences in perceptions of the groups seems appropriate. Parents considered themselves as more interested in their children's education than they were thought to be by teachers. The major reason parents gave for lack of interest in long-range educational goals by themselves and their children was the urgent need to augment family income at the earliest opportunity. In accordance with this view, parents felt that the purchase of school clothing and payment of school costs to be extremely burdensome, while school personnel tended to consider such expenses negligible. It seems safe to say that the school personnel sample generally did not realize that school

related expenses are extremely high for families with very limited incomes. Scholarships, bursaries, loans, the integration of classes with part-time employment and the reduction of costs to parents as much as is possible are some of the ways in which the financial burden of education might be lessened.

Teachers felt that parents were poorly informed on the aims and functions of the school. This perceived lack of parental knowledge of school activities may be accurate and may explain why parents were more content than teachers with their children's school programs. However, principals also tended to be less critical than teachers of programs, which may indicate a lack of communication between teachers and principals.

The adaptation of materials for children living in low income neighbourhoods, to maximize the learning potential of such materials, might best be done by school board curricula staff and/or the classroom teachers concerned.

Teachers and principals felt that the lack of resources to develop the extracurricular interests of disadvantaged children was detrimental to their education. Parents did not agree, perhaps because they did not realize the extent of services available to more advantaged children. As the talents of these children apparently are identified by the school rather than the home, the school might be the more appropriate agency to oversee their development.

The parents in this sample did not recognize the well-established finding that children from impoverished backgrounds start grade one at a disadvantage. Presently, local school boards are becoming more concerned in overcoming environmental deficits by providing appropriate preschool experiences. A public relations program may be necessary to ensure maximum co-operation of parents.

Finally, the areas of disagreement shown by this study were more numerous and the differences in perceptions more pronounced than had been anticipated. There seems to be a serious lack of communication between the parent and school groups. It would seem to be the responsibility of school personnel to establish communication with low income parents so that parents, teachers and principals can work together to understand and, where possible, alleviate some of the problems delineated here.

References

Alberta, Executive Council. Community Opportunity Assessment, vol. 2, *The Edmonton study*. Edmonton: Human Resources Research and Development, 1967.

Alberta, Executive Council. Community Opportunity Assessment, vol. 3, *The Calgary study*. Edmonton: Human Resources Research and Development, 1967.

Alberta, Executive Council. Community Opportunity Assessment, vol. 4, *Metis of the Lac la Biche area*. Edmonton: Human Resources Research and Development, 1967.

Mulligan, R. Socio-economic background and college enrollment. *American Sociological Review,* April, 1951. p. 196.

The Alberta Journal of Educational Research *Vol. XVIII, No. 1, March, 1972*

D. A. DAWSON

Educational Quality Indices

Two educational quality indices, a "product" and a "process" index, were constructed for Ontario secondary schools. The "product" measure was based on scores achieved in tests administered to students in grades 9, 10, 11, and 12. Nine input measures such as teacher/student ratio and teaching experience were used to develop the "process" quality index. These two indices were found to be uncorrelated. The finding of non-comparability of "product" and "process" educational quality indices reported in previous studies was therefore substantiated. Researchers who desire to use an educational quality index in future might be well advised to use a "product" measure for a number of reasons. (Dr. Dawson is an Assistant Professor in the Department of Economics at McMaster University in Hamilton, Ontario.)

The analysis of educational quality has had a long history beginning with the preliminary work of Ayres (1909) and Cooke (1910) at the turn of the century. Some quality measures have been developed for use in studies concerning the "cost-quality nexus." These studies have analysed the direct relationship between increases in quality of education and cost per student. Quality measures have also been developed to compare school systems and to provide weighted measures of school output for use in studies of economies of scale.

In general, there are two basic types of quality measures: objective measures and subjective measures. The former, in turn can be approached from the "product" point of view or the "process" point of view. It is the aim of this paper to (a) describe briefly the types of measures, (b) report on an attempt to construct two measures for which data were available and (c) comment upon the comparability of the measures.

Objective Quality Measures

A "product" objective measure typically measures quality by the level of student attainment on various types of achievement tests. Many problems arise with the use of this type of measure. First, the goals of different

communities or systems may differ, and no one test or set of tests can cover the objectives of all the communities and systems at once. Second, "tests cannot and do not cover *all* aspects of learning that are worthwhile in . . . subject areas (Kershaw & McKean, 1959, p. 10)." Third, performance depends to a large but unmeasured extent upon the pupil's socio-economic background. Finally, the results of such tests depend upon the individual's "frame of mind, his motivation, his health, and many other chance factors and not merely on the extent of his learning (Kershaw & McKean, 1959, p. 11)."

Probably the most widely known "product" measure is that which was constructed by the Quality Measurement Project of the New York State Education Department. This project tested 70,000 students in 100 school systems over a four-year period (Firman, 1963, p. 102). The testing instruments used were the Iowa Tests of Basic Skills or the Iowa Tests of Educational Development. Another more recent study was that carried out using "Project TALENT" data in 206 high schools (Thomas, 1962).

Because of the cost of sampling and measurement problems involved in "product" measures, most researchers have exhibited a preference for "process" measures. The process measures have typically focused on (a) the *quality* of inputs or (b) the *adaptability* of school systems. Examples of variables which have been put forward as good quality of input measures are (a) teacher/student ratio; (b) teacher turnover; (c) teacher experience; and (d) teacher education.

The best known measure of adaptability is "The Growing Edge" (Mort, Vincent & Newell, 1946). This device measures the degree to which schools have changed their teaching techniques and curricula in recognition of new knowledge from the fields of psychology and/or education research. Unfortunately, this type of index is very expensive to create, and accordingly an attempt was not made to construct one for the present study.

Subjective Quality Measures

As their name implies, subjective measures are not easily developed. Assessors must go into each school in the test area and give ratings on such measures as "Discovery and Development of Special Aptitudes," "Development of Gross Behaviour Patterns," and the "Amount of Consideration of the Individual." It is very difficult to obtain consistent estimates of these measures unless one person does all the assessing. Further, the employment of the teams of researchers needed for the development of this type of measure over a broad area would prove to be very costly. Owing to these problems an attempt to construct a subjective quality measure has not been made.

Construction of Quality Indices

An attempt has been made to construct cross section quality indices. Individuals have constructed these indices to measure differentials in the quality of such diverse items as mental patient care, farm housing, religious work in diocese, and the agricultural value of soils. In the field of education, initial efforts to quantify state quality differentials in the

United States were made in the 1920's (Ayres, 1920; Phillips, 1925). More recent work in this area is exemplified by the educational index developed by Hirsch (1960).

When constructing indices of this type three basic methods can be adopted. In Method I all observations for each variable to be included in the index are ranked. The ranks obtained by each school (in this case) for each variable are then summed and divided by the number of variables in the index. In Method II the value of each observation of a variable is divided by the mean of that variable to get a "corrected" observation. To get each school's index, the "corrected" observation for each variable is summed and the total is divided by the number of variables in the index. In Method III each observation is standardized by first subtracting from it the mean of sample of which it is a part and then dividing by the standard deviation of this sample. The observations are summed in the same manner as described in Method II.

In algebraic terms:

Method I index $= \dfrac{\sum_{i=1}^{N} X_i}{N}$

where X_i = rank in variable

N = number of variables

Method II index $= \dfrac{\sum_{i=1}^{N} \frac{X_i}{U_i}}{N}$ and

Method III index $= \dfrac{\sum_{i=1}^{N} Z_i}{N}$

where X_i = value of a given observation of variable i

U = mean of all observations for variable i

N = number of variables

σ = standard deviation of observations for a given variable

$Z_i = \dfrac{X_i - U_i}{\sigma}$

McMillan (1946) compared the results obtained using these three methods to calculate Farm Housing Indices and found the indices to be highly correlated. He pointed out that although the first two indices were simple to construct there was a problem, particularly with Method II, in that those items which possessed greater variability received larger weights. Method III eliminated this weakness through dividing by the standard deviation; for this reason it was used in the construction of the following quality indices.

The "product" quality measure, Index A, was based upon scores achieved in tests administered by the Carnegie Foundation to students registered in Grade 9 in all sectors of the Ontario Secondary School

System in 1959; 90,719 students initially wrote the CAAT, CEAT and CMAT. The following year the same students (minus "drop-outs") wrote the CTGF, CATF, CATE, and CATM. In Grade 11 they wrote the CPTO and CGT, and in Grade 12 the remainder of the tests were written. These tests are fully titled in Table 1.

TABLE 1

TITLES OF TESTS OF CARNEGIE STUDY

1. Canadian Academic Aptitude Tests (CAAT)
   (a) CAAT I —Verbal Reasoning
   (b) CAAT II —Mathematical Reasoning
   (c) CAAT III —Non-Verbal Reasoning
2. Canadian English Achievement Tests (CEAT)
   (a) CEAT I —Reading Achievement
   (b) CEAT II —Mechanics of Expression
   (c) CEAT III —Effectiveness of Expression
3. Canadian Mathematics Achievement Tests (CMAT)
   (a) CMAT I —Arithmetic Computation
   (b) CMAT II —Facts, Terms and Concepts
   (c) CMAT III —Measurement
4. Canadian Test of General Information (CTGI)
5. Canadian Achievement Test in French (CATF)
6. Canadian Achievement Test in English (CATE)
7. Canadian Achievement Test in Mathematics (CATM)
8. Canadian Physics Test (Ontario Edition) (CPTO)
9. Canadian Geometry Test (Ontario Edition) (CGTO)
10. Scholastic Aptitude Test—Verbal I
11. Scholastic Aptitude Test—Verbal II
12. Scholastic Aptitude Test—Verbal Total
13. Scholastic Aptitude Test—Mathematics
14. Achievement Test in French
15. Test in English Structure and Usage

Rather than measuring quality by absolute scores, Index A was constructed from changes in average score in tests which measured the same abilities. Changes in scores were utilized to avoid some of the bias which could have been introduced by variation in socio-cultural background. The tests which were paired are indicated in Table 2 (e.g., X_1 is the change in average scores achieved in the Canadian Academic Aptitude Verbal Reasoning test and the Scholastic Aptitude Verbal Test).

Thus, to obtain a school's quality rating using Index A, the standardized value of the change in the average mark obtained by students in the school in each of the paired tests were compiled. Then these values were summed and divided by the number of paired tests (i.e., Method III was used). To avoid problems involving student movement between schools, only the scores of those students remaining in one school throughout the entire four year testing period were taken into consideration when evaluating a school's performance.

TABLE 2

TESTS PAIRED FOR USE IN OUTPUT QUALITY INDEX

Tests		Tests																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
CAAT I	1																					
CAAT II	2																					
CAAT III	3																					
CEAT I	4																					
CEAT II	5																					
CEAT III	6																					
CMAT I	7																					
CMAT II	8																					
CMAT III	9																					
CTGI	10																					
CATF	11																					
CATE	12				X_7		X_9	X_{10}														
CATM	13		X_3					X_{11}	X_{15}	X_{19}												
CPTO	14		X_4					X_{12}	X_{16}	X_{20}												
CGTO	15		X_5					X_{13}	X_{17}	X_{21}				X_{26}								
SCHAptTest Verb I	16																					
SCHAptTest Verb II	17																					
SCHApt Test Verb Tot	18	X_1			X_8								X_{24}									
SCHAptTest Math	19		X_6					X_{14}	X_{18}	X_{22}				X_{27}	X_{28}	X_{29}						
Eng TESU	20	X_2											X_{25}				X_{30}					
Fr ATF	21											X_{23}										

A positive correlation was expected between the pairings, i.e., the students in a "good" school should have shown a consistent improvement. However, the matrix of correlations shown in Table 3 indicates that variables 7, 9, 27, 28, 29 and 30 failed to yield a general positive correlation; there was no simple explanation for this fact. Three of those pairings were in Mathematics and Science and three in English so the cause of the perverse behavior did not lie in any one subject area. However, despite the lack of an explanation for the negative values, it was apparent that something had to be done about these six pairings and the method adopted was simply to delete these variables. Thus, the construction of Index A was based on the remaining 24 variables so that a positively signed homogeneity could be preserved.

The "process" quality index, Index B, was constructed from the input rather than the adaptability point of view. There were many likely

TABLE 3 CORREL

	1	2	3	4	5	6	7	8	9	10	11	12	13
1													
2	.88												
3	.16	.20											
4	.73	.66	.41										
5	.58	.46	.55	.69									
6	.59	.61	.12	.41	.33								
7	-.54	-.34	-.08	-.50	-.39	-.09							
8	.77	.71	.12	.52	.44	.68	-.01						
9	-.59	-.39	-.11	-.54	-.42	-.11	-.96	-.03					
10	.07	.12	-.04	-.02	-.08	-.14	.55	.28	.46				
11	.12	.15	.94	.35	.51	.06	.10	.24	.09	.16			
12	.68	.57	.35	.92	.63	.29	-.32	.62	-.33	.23	.42		
13	.52	.38	.44	.59	.87	.20	-.14	.58	-.14	.28	.56	.73	
14	.33	.28	.01	.15	.15	.58	.36	.76	.41	.41	.23	.39	.47
15	.13	.20	.92	.34	.49	.08	.15	.25	.13	.21	.98	.40	.53
16	.67	.59	.35	.91	.61	.29	-.26	.61	-.28	.30	.41	.98	.70
17	.51	.41	.44	.57	.84	.19	-.07	.58	-.08	.36	.56	.70	.98
18	.30	.30	-.00	.11	.10	.55	.45	.73	.49	.51	.20	.32	.40
19	.07	.13	.95	.32	.48	.06	.13	.17	.12	.14	.98	.36	.50
20	.70	.62	.37	.95	.65	.32	-.34	.61	-.36	.21	.41	.98	.69
21	.54	.42	.48	.62	.91	.23	-.17	.56	-.18	.24	.56	.71	.98
22	.31	.34	.02	.14	.13	.66	.41	.74	.45	.38	.19	.31	.36
23	.24	.24	.31	.47	.48	.45	.06	.42	.10	-.11	.32	.44	.42
24	.93	.75	.13	.72	.59	.51	-.67	.74	-.65	-.10	.11	.69	.55
25	.78	.82	.16	.61	.47	.63	-.45	.76	-.39	-.21	.16	.57	.42
26	.43	.25	-.53	.24	.38	.27	-.31	.35	-.31	-.03	-.51	.25	.39
27	.08	.01	-.90	-.24	-.40	.30	.03	.16	.06	.03	-.88	-.24	-.34
28	-.49	-.42	-.39	-.89	-.58	.06	.48	-.22	.52	-.06	-.36	-.85	-.53
29	-.33	-.22	-.54	-.55	-.89	.13	.37	-.13	.40	.01	-.52	-.53	-.81
30	-.79	-.44	-.06	-.60	-.50	-.17	.71	-.43	.75	-.05	-.02	-.59	-.49

X_1 = Variable 18 minus Variable 1
X_2 = " 20 " " 1
X_3 = " 13 " " 2
X_4 = " 14 " " 2
X_5 = " 15 " " 2
X_6 = " 19 " " 2
X_7 = " 12 " " 4
X_8 = " 18 " " 4
X_9 = " 12 " " 5
X_{10} = " 12 " " 6

X_{11} = Variable 13 minus Vari
X_{12} = " 14 " "
X_{13} = " 15 " "
X_{14} = " 19 " "
X_{15} = " 13 " "
X_{16} = " 14 " "
X_{17} = " 15 " "
X_{18} = " 19 " "
X_{19} = " 13 " "
X_{20} = " 14 " "

RED TESTS

18	19	20	21	22	23	24	25	26	27	28	29	30
.18												
.30	.37											
.37	.53	.71										
.95	.20	.32	.36									
.38	.33	.46	.45	.41								
.25	.05	.69	.55	.27	.25							
.34	.12	.58	.43	.41	.36	.85						
.16	-.56	.24	.37	.16	-.07	.47	.30					
.25	-.88	-.24	-.37	.26	-.09	-.07	-.08	.62				
.17	-.33	-.87	-.55	.18	-.28	-.51	-.35	-.11	.43			
.17	-.49	-.54	-.89	.19	-.29	-.37	-.21	-.25	.58	.66		
-.19	.04	-.58	-.48	.03	.72	-.82	-.40	-.47	-.03	.54	.43	

=	Variable	15	minus	Variable	9
=	”	19	”	”	9
=	”	21	”	”	11
=	”	18	”	”	12
=	”	20	”	”	12
=	”	15	”	”	13
=	”	19	”	”	13
=	”	19	”	”	14
=	”	19	”	”	15
=	”	20	”	”	16

measures from which a "process" quality index could have been constructed. However, because of data problems, only nine measures were considered for inclusion into a composite index.

The measures were as follows: (a) teacher/student ratio; (b) teacher turnover; (c) average number of teachers with an M.A. degree; (d) average number of fully qualified teachers (teachers not teaching with a temporary certificate or letter of permission); (e) average number of teachers with a B.A. degree; (f) average number of basic certificates per teacher; (g) average number of specialist certificates per teacher; (h) average number of teachers with 5 or more years' experience; (i) average number of teachers with 2 or more years' experience. The data for number of teachers were compiled from the 1964 Report of the Minister of Education, and the remaining figures were taken from the 1964 "Blue Book" (Government of Ontario, 1964).

A matrix of simple correlations between the measures is shown in Table 4. These results indicate that all measures were positively correlated except for Variable (a) (teacher/student ratio) and seven of the remaining eight variables. In these cases the correlations were negative. This result was surprising but, since teacher/student ratio is also a proxy for class size, it would seem to lend some credence to the poor rating given this latter variable by a number of authors. Burkhead (1967), in particular, feels that class size varies too greatly between subject areas and grade levels to be a good quality measure.

Raymond (1968) also found the teacher/student ratio to be insignificant. He postulated that high ratios may have been due to under-utilization of teachers in rural areas and the ratio might then, in turn, have been a proxy for an inadequately organized school system and could therefore have been associated with poor quality.

The general positive correlation between the remaining variables indicated that they might all have been considered measures of the same

TABLE 4

CORRELATION OF MEASURES

	Measures								
Measures	a	b	c	d	e	f	g	h	i
a	1.0								
b	-0.121	1.0							
c	-0.023	0.021	1.0						
d	-0.063	0.149	0.426	1.0					
e	-0.127	0.020	0.473	0.458	1.0				
f	-0.103	0.275	0.338	0.530	0.312	1.0			
g	0.139	0.086	0.128	0.229	0.125	0.337	1.0		
h	-0.171	0.145	0.278	0.399	0.309	0.460	0.495	1.0	
i	-0.172	0.232	0.297	0.400	0.278	0.467	0.367	0.699	1.0

Note—Critical values: 95% = 0.164, 99% = 0.230.

thing (quality). Accordingly, Index B was constructed using Method III on those eight variables.

Given the rationale behind their construction it was expected that Index A and Index B would be positively and significantly correlated. However, an analysis of 303 paired observations yielded an insignificant correlation of -.02 between them.

An attempt was made to make the indices more comparable by means of factor analysis. Specifically, each component of a factor (i.e., each variable in the relevant quality index) was weighted by its factor loading which was arrived at by the "Varimax" method. (The "Varimax" method merely normalizes the results of the "Principal Axis" method.) The loadings are the correlation coefficients between the index components and the factors. New quality indices were constructed using the weights and these new indices were then compared. This analysis was simplified by the fact that when a factor analysis using both the "Principal Axis" and "Varimax" methods was carried out on Index B, only one factor was significant. On the other hand, Index A yielded five factors (A, B, C, D, and E). The correlations between the weighted indices are shown in Table 5. Unfortunately, none of of the weighting schemes made the indices more comparable.

TABLE 5

CORRELATION OF "FACTOR LOADED" QUALITY INDICES

	Index B
Index A (A)	.05
Index A (B)	.03
Index A (C)	.017
Index A (D)	.0025
Index A (E)	.01

Note—Index A (A) is the new Index A arrived at by using the loadings in Factor A.

Conclusion

The problem of non-comparability is not specific to this data set. Similar results have also been arrived at using Iowa and West Virginia data (Cohn, 1968; Raymond, 1968). The question therefore arises as to which type of index is better suited for analytical purposes. Although an unequivocal claim for superiority can be made for neither it seems intuitively clear that "product" is the better measure. Despite the drawbacks mentioned above the "product" measure has one major advantage—it is a *direct* measure of quality. "Process" measures are *indirect* measures and as a result any quality index constructed by this method must be treated with less confidence than the "product" measure.

It should be noted that one recent study by Katzman (1968) has also implicitly supported product measures in that it found that no inputs had consistent effects on all the outputs considered; thereby the result derogated input surrogates for school "quality."

References

Ayres, L. P. *Laggards in our schools.* New York: Russel Sage Foundation, 1909.

Ayres, L. P. *An index number of state school systems.* New York: Russell Sage Foundation, 1920.

Burkhead, J. *Input and output in large city schools.* Syracuse: Syracuse University Press, 1967.

Cohn, E. Economics of scale in Iowa high school operations. *The Journal of Human Resources,* 1968, *3*, 422-434.

Cooke, M. E. *Academic and industrial efficiency.* New York: The Carnegie Foundation for the Advancement of Teaching, 1910.

Firman, W. D. The relationship of cost to quality in education. *Long range planning in school finance,* based on Proceedings of the Sixth National School Finance Conference, St. Louis, 1963.

Government of Ontario, Department of Education. *Schools and teachers in the Province of Ontario—Secondary Schools, Teachers' Colleges and Technical Institutes, 1964.* Toronto: Queen's Printer, 1964.

Hirsch, W. Z. Determinants of public education expenditures. *National Tax Journal,* 1960, *13*, 29-40.

Katzman, M. T. Distribution and production in a big city elementary school system. *Yale Economic Essays,* 1968, *8,* 201-256.

Kershaw, J. A., & McKean, R. N. *Systems analysis and education.* Santa Monica: RAND Corporation Research Memorandum RM-2473-FF, 1959.

McMillan, R. T. Comparison of farm housing indices from Oklahoma. *Social Forces,* 1945-46, 174-180.

Mort, P. R., Vincent, N. S., & Newell, C. A. *The growing edge.* New York: Metropolitan School Study Council, 1946.

Raymond, R. Determinants of the quality of primary and secondary public education in West Virginia. *The Journal of Human Resources,* 1968, *3*, 450-470.

Thomas, J. A. Efficiency in education: An empirical study. *Administrators' Notebook,* October, 1962.

The Alberta Journal of Educational Research *Vol. XVIII, No. 1, March, 1972*

K. F. KENNETT

Intelligence and Socioeconomic Status in a Canadian Sample

The positive relationship, in favour of upper socioeconomic status children, between intelligence and socioeconomic status was subjected to further investigation. In a somewhat homogeneous sample of children, upper socioeconomic status children were found to be intellectually superior to middle class children even though all lived in similar residential areas and attended the same schools. Such a finding suggests that upper socioeconomic status children, on the whole, are intellectually superior to middle class children because of inherited factors, or environmental factors originating in the home, or both. (Dr. Kennett is an Assistant Professor of Psychology at St. Francis Xavier University Sydney Campus, Sydney, Nova Scotia.)

Although traditional measures of intelligence attempt to assess only a few of man's thinking abilities (Cropley, 1967; Getzels and Jackson, 1962; Torrance, 1962) they do provide some source of predictability and comparison among individuals. Of importance to this comparison is the influence of environmental factors upon the performance of individuals on conventional intelligence tests. Environmental factors do influence such performances and these effects have repeatedly been demonstrated in a large number of studies including those of Bernstein (1960), Centers (1950), Davis (1948), Gordon (1923) and Riessman (1962). In fact, mental tests measure human behavior, and environmental factors affect the degree of efficiency of this behavior. Thus home, school and social class, as aspects of environment, have an important influence upon how well individuals perform.

Already there are a considerable number of studies (Anastasi, 1958; Burt, 1922; Eells, Davis, Havighurst, Herrick and Tyler, 1951; MacArthur and Elley, 1963) which have related measured intelligence, Intelligence C (Vernon, 1955), with social class environment. A positive relationship, in favour of upper social class children, has been demonstrated between intelligence (IQ) and socioeconomic status (SES). For example, Davis

(1948) clearly demonstrated the strong relationship between SES and Intelligence C by showing that items on a number of frequently used mental tests significantly discriminated between socioeconomic groups. This discrimination among children by IQ tests, according to SES, has been reported since the turn of the twentieth century. Binet and Simon (1916), in explaining the difference between their norms and those obtained for a sample of Belgian children, pointed to factors which depend 'partly upon family circumstances'. Stern (1914), with upper class German children, and Burt (1922), in an examination of social classes in England, came to the same conclusion.

Whether the superior performance by upper SES children over lower SES children on conventional intelligence tests results mainly from heredity or environment is unknown. What is known is that every measurable ability is the product of a genetic potential interacting with certain postnatal and environmental conditions (Burt, 1949). The reflection of class differences in the scores obtained on intelligence measures is understandable when it is realized that certain segments of the society are confronted with tasks requiring skills which facilitate or impede individuals and sub-groups in particular ways because of social experience.

In an examination of the relationship between IQ and SES an important skill which separates one social group from one another is that of language. This is not surprising when it is realized that the ability to manipulate verbal symbols seems to play an important part in the process of thinking and problem solving. Terman and Merrill (1937) considered language to be essentially, the shorthand of the higher thought process. Eells, *et al.,* (1951) indicated that SES was the chief factor affecting scores on intelligence tests, and pointed out that the largest advantage gained by middle or upper SES children was on verbal items. Success in school is based on a facility to handle a middle-class vocabulary, for the middle-class child is capable of responding to, manipulating and understanding a public language (Bernstein, 1958).

Past research has indicated that children from middle to upper class groups possess an adequate public language and in a comparison with lower SES children, show a superior performance on conventional tests of intelligence. However, such findings have frequently been based on comparisons between the polarities of social class membership, while less frequent examinations have been made among children within a broad social class such as the middle class. Thus, the present study examined the importance of socioeconomic status, based on father's occupation and confirmed by the MacArthur-Elley modification (1963) of the Gough Home-Index (1949), in influencing the performance, on an IQ test, of children who seemed to have opportunities for similar social and environmental experiences in terms of dwelling area, formal schooling, teachers, and peer-relationships. Hence, the present study was concerned with extending the usual relationship between IQ and SES by selecting a somewhat homogeneous school sample.

Method

Subjects

The subjects consisted of virtually the entire grade six, seven and eight population of two Regina Elementary Public Board Schools, situated in middle class residential areas. Of the total enrolment of 198 children, 170 were eventually used as subjects in the study. The remaining 28 children (18 males and 10 females, of whom 14 attended each school) were excluded, with the aid of a table of random numbers, because they had siblings among the other 170 children. Thus, this ensured that only one child from each family was in the study, and avoided bias in the data resulting from familial similarity among subjects, The subjects included 91 boys for whom the mean verbal IQ was 110.7 (SD = 10.2; range 83-129), while the corresponding figure for the 79 girls was 113.0 (SD = 9.7; range 87-133). The mean age of the boys was 12 years 9 months (SD = 12.4 months; range—11 years 2 months to 15 years 9 months) and the girls 12 years 8 months (SD = 11.7 months; range—11 years 2 months to 15 years 3 months).

Tests

The specific intelligence test used was the Otis Quick Scoring Mental Ability Test: Beta Form: Test A, an instrument particularly suited to the measurement of a general intelligence based on verbal skills for children in Grade Six, Seven and Eight.

Socioeconomic status was based on father's occupation (Kahl & Davis, 1955) and on the life-style of the subjects. The latter was scored in terms of the general "goodness" of his family life (MacArthur &Elley modification of the Gough Home-Index, 1963).

Procedure

The Otis Mental Ability Test was administered to the initial sample of children in December, 1968. Later, in March, 1969, the MacArthur-Elley version of the Gough Home-Index was completed by each child.

On the basis of the information collected, the 170 children were placed into SES groups (Davis, Gardner & Gardner, 1941; Edwards, 1943). Social Class I included children from professional homes, Social Class II children whose fathers were semi-professional and managerial, Social Class III those from families where the father belonged to the occupational group of lower managerial, salesmen and clerks, Social Class IV children of skilled workers, supervisors in trades, and tradesmen, while the two lowest groups consisted of children of semi-skilled and unskilled fathers. These two groups were pooled to form Social Class V, because of the small number of children in each. These five SES groups contained 21.8, 27.1, 27.6, 15.3 and 8.2% of the total sample, respectively.

Data Analysis

Differences in mean IQs among socio-economic status groups, further subdivided according to sex, were tested using the two-way analysis of variance procedure described by Winer (1962, pp. 241-242).

Results

Analysis of variance showed a definite relationship between intelligence and socio-economic status (F = 11.03, df = 4/160; $P<0.01$), and further confirmed the numerous studies which have reported a positive relationship between IQ and SES. Mean and standard deviations of IQ scores for the five SES groups are shown in Table 1.

TABLE 1

MEANS AND STANDARD DEVIATIONS OF IQ SCORES FOR SEX GROUPS AND FULL SAMPLE DIVIDED INTO SES SUBGROUPS

Subjects		SES Subgroups				
		I	II	III	IV	V
Male (N = 91)	N	20	22	25	16	8
	Means	115.0	116.0	106.8	108.6	101.9
	SD	9.8	6.7	9.2	9.7	10.9
Female (N = 79)	N	17	24	22	10	6
	Means	117.5	117.3	108.3	110.3	104.7
	SD	7.7	7.2	8.0	9.4	13.6
Total (N = 170)	N	37	46	47	26	14
	Mean	116.1	116.7	107.5	109.3	103.1
	SD	8.8	7.0	8.6	9.6	12.2

Note—These data satisfy the requirements of within cell homogeneity of variance (F_{max} = 4.1; df = 10/24)

A summary of the analysis of variance on these data is shown in Table 2.

In the examination of the results relating to the relationship between IQ and SES, multiple *t* tests (Winer, 1962, p. 244) showed that the mean IQs of the two highest SES groups differed significantly from virtually all those obtained for the three lowest groups, among males and females separately, and also in the case of the full sample, but not from each other.

The strong relationship between SES and IQ, in favour of the highest SES groups, was confirmed by correlational data. The correlations between SES and IQ for males, females and the full sample respectively were 0.41 (df = 168, $p<0.01$), 0.41 (df = 77; $p<0.01$) and again 0.41 (df = 0.01). The scores for SES, based on the Home-Index scores, were closely related to those based on father's occupation, and acted as a construct validity test of the measure of SES used. The full sample correlation

TABLE 2

SUMMARY OF ANALYSIS OF VARIANCE FOR SOCIOECONOMIC STATUS, SEX AND INTELLIGENCE

Source	Sum of Squares	df	Mean Square	F
Sex	129.2	1	129.2	1.57
SES	3,624.1	4	906.0	11.03*
Sex x SES	10.88	4	3.0	0.04
Within Cell	13,152	160	82.2	

*$p < 0.01$

between Home-Index and scores on occupational status was 0.50 ($df = 168$; $p < 0.01$).

Discussion

The findings of the present study further support the numerous studies which have clearly shown that a definite relationship exists between intelligence and socioeconomic status, in favour of the high SES groups. Furthermore, the results indicate that within a somewhat homogeneous Canadian school sample, this relationship still remains. In many studies (e.g. Eells *et al.,* 1951) the chief factor affecting scores on intelligence tests has been socioeconomic status, in terms of comparisons between the upper and middle class as a distinct school population on the one hand, and the lower class on the other. The major difference between these two broad SES groups has been on performance on verbal items (Eells *et al.,* 1951), for, although deprived children use a great many words with a fair amount of precision, such words are not words used in school. The present research would indicate a finer relationship, placed on a continuum, in which middle class children may possess a school, or formal, language (Bernstein, 1958) but an inferior one to upper SES children.

The present study examined subjects from a homogeneous middle-class community (Havighurst, 1961). However, certain subjects may have differed in terms of a superior prestige rating because of father's occupation and additional cultural and luxurious possessions within the home (Kahl, 1956). The Home-Index confirmed the latter. Thus, the family environment with its possessions and position of prestige based on father's occupation, may still be of considerable importance, even in samples of children who enjoy the apparent outward benefit of similar residential areas and formal schooling. The general lumping, of middle and upper SES children, for comparison with lower SES children on intelligence C may hide relevant and pertinent differences which still exist between the upper and middle class child.

References

Anastasi, A. Heredity, environment and the question "How"? *Psychological Review,* 1958, *65,* 197-208.

Bernstein, B. Some sociological determinants of perception. *British Journal of Sociology,* 1958, *9,* 159-174.

Bernstein, B. Language and social class. *British Journal of Sociology,* 1960, *11,* 271-276.

Binet, A., & Simon, T. *The development of intelligence in children.* Baltimore: Williams and Wilkins, 1916.

Burt, C. *Mental and scholastic tests.* London: Staples, 1922.

Burt, C. The structure of the mind: a review of the results of factor analysis. *British Journal of Educational Psychology,* 1949, *19,* 176-199.

Centers, R. Four studies in psychology and social status: a special review. *Psychological Bulletin,* 1950, *47,* 263-271.

Cropley, A. J. *Creativity.* London: Longmans, Green, 1967.

Davis, W. A. *Social-class influences upon learning.* Cambridge: Harvard University Press, 1948.

Davis, W. A., Gardner, B. B., & Gardner, M. R. *Deep south.* Chicago: Chicago University Press, 1941.

Edwards, A. M. *Comparative occupational statistics for the U.S. 1870-1940.* Washington: Washington Government Printing Office, 1943.

Eells, K., Davis, W. A., Havighurst, R. J., Herrick, V, E., & Tyler, R. W. *Intelligence and cultural differences.* Chicago: Chicago University Press, 1951.

Getzels, J. W. & Jackson, P. W. *Creativity and intelligence.* New York: Wiley, 1962.

Gordon, H. *Mental and scholastic tests among retarded children.* London: Board of Education Pamphlet No. 44, 1923.

Gough, H. A short social status inventory. *Journal of Educational Psychology,* 1949, *40,* 52-56.

Havighurst, R. J. Social class influences on American education. In Henry, N. B. (Ed.). *Social forces influencing American education: Yearbook of the National Society for the Study of Education,* 60. Chicago: Chicago University Press, 1961.

Kahl, J. A., & Davis, A. J. Comparison of indices of socio-economic status. *American Sociological Review,* 1955, *20,* 317-332.

Kahl, J. A. *The American class struggle.* New York: Holt, Rinehart, Winston, 1957.

MacArthur, R. S. & Elley, W. B. The reduction of socioeconomic bias in intelligence testing. *British Journal of Educational Psychology,* 1963, *33,* 107-119.

Riessman, F. *The culturally deprived child.* New York: Harper & Row, 1962.

Stern, W. *The psychological methods of testing intelligence.* Baltimore: Warwick and York, 1914.

Terman, L. M., & Merrill, M. A. *Measuring intelligence.* London: Harrap, 1937.

Torrance, E. P. *Guiding creative talent.* New Jersey: Prentice-Hall, 1962.

Vernon, P. E. The assessment of children: University of London Institute of Education. *Studies in Education,* 1955, *7,* 198-215.

Winer, B. J. *Statistical principles in experimental design.* New York: McGraw-Hill, 1962.

The Alberta Journal of Educational Research *Vol. XVIII, No. 1, March, 1972*

L. LEHTINIEMI

A Tested Theory of Student Unrest[1]

Status inconsistency arising from simultaneous student and adult role prescriptions may be a source of stress which can lead to protest activity under certain conditions. A number of hypotheses derived from the general theory were tested using data yielded by 225 questionnaires obtained from undergraduates at two Ontario universities during the 1969-70 academic year. Results of the analysis indicated that students who approximate adults more than "pre-adults" were more likely to have been involved in protests and also to have been more actively involved. It is suggested that one means of reducing status inconsistency is to acknowledge the adult status of a growing proportion of students by granting them participation on decision making bodies in the academic community. (Mr. Lehtiniemi is with the Industrial Training Branch of the Ontario Department of Labour.)

Student unrest appears to have waned even more quickly than it emerged as an activity common to many Canadian and American campuses. Relatively few incidents of collective action by students attempting to stimulate institutional change have been reported since the spring of 1970. However, little in fact is yet known about why student activism emerged when it did, and as suddenly as it did. The phenomenon inspired many armchair analysts, but few researchers. One must literally dig through the speculative offerings to isolate a relative handful of empirical studies. Even then, it is difficult to find studies that empirically test hypotheses derived from theoretical explanations, as opposed to those which merely describe characteristics of some activist students.

To some, the paucity of tested explanations may be of little concern. Instead, they are relieved that students appear to have "returned to their senses" and are now behaving in a more normal manner. In contrast,

[1] The helpful comments of J. E. Curtis on an earlier draft of the manuscript are gratefully acknowledged by the author.

educators and the social scientists should still be interested in understanding student unrest, whether it be to satisfy intellectual curiosity, or from a more pragmatic standpoint, to be better able to prevent or cope with future disturbances. It is to such an audience that this brief summary of a proposed theory of student unrest, and some of the empirical findings which thus far favourably support it, are directed.

Theoretical Considerations

Education has undergone rapid change since the advent of the Atomic Age, and especially during the last decade. Of particular significance are the changes in the student population at the post-secondary levels of education. Universities and colleges are no longer the almost exclusive "finishing schools" for the children of a privileged elite. Student enrolments have multiplied, and the socio-economic base from which students are drawn has broadened since student-aid programmes were introduced. Also, more students are remaining longer in the educational setting, and more older students are returning to complete or continue formal studies. A separate trend, and one not exclusive to education and students, is that young people appear to be maturing at an earlier age. The recent lowering of the voting age in many political jurisdictions is one indicator of this change. The net effect, in brief, is that more students are now also adults, by legal definition at least, but often by cultural definitions as well.

The significance of this trend becomes apparent if one examines the cultural meanings which have over time become associated with the student role. Since the time of the early Greeks the student role has embodied both pre-adulthood and dependence. With the relatively recent introduction of compulsory education, student and childhood became almost synonymous. Even until modern times university was often regarded by the few who could afford to attend as an extension of adolescent irresponsibility—a deferment of adulthood. Studenthood has historically been equated with a period of *becoming*, only at the end of which the student entered adult society.

The concept of *in loco parentis* was entirely consistent with this definition of the student role, but more important, it also emphasized the subordinate position of the student to the educator, not only in things academic but in all matters. It is specifically because students were perceived as pre-adult that the educators assumed the surrogate parental role and responsibilities, and one might add, rights over the activities of the students. The subordinate position of students is still symbolically manifested in the final rites of passage when the university graduand often kneels in a final act of submission while receiving his "colour". How quaint—yet so consistent with the traditional, cultural definition of the student role.

A revised definition of the student role consistent with changed reality has not yet emerged. Thus many students find themselves with dual and incompatible roles and statutes. On the one hand, they are often adults by virtue of age, marital status, financial independence, and other criteria associated with adulthood in our culture. But at the same time, they are also students. As such they are perceived as pre-adults in need of mature

guidance by their elders, including the educators who see themselves in a quasi-parental role. Today's student-adults experience status inconsistency which is not conducive to effective social interaction, and which is a source of stress.

As students, they probably accept as legitimate their academically subordinate position relative to faculty. Presumably they attend university because they hope, among other things, to acquire some knowledge from their mentors. Even when they clamour for more power to set curricula, they assume that the faculty will be able to offer instruction in the desired "new" courses.

However, the students who perceive themselves as adults may *not* be willing to accept subordination to educators in the non-academic dimensions of university life. Some of the student-adults expect to be treated, and listened to as adults in non-learning interaction situations. They act accordingly. Their behaviour may violate the role expectations of those educators and administrators who perceive them primarily as students, hence pre-adult, dependent, and subordinate. Given that the two parties hold different perceptions of the status of the student-adults, it is easy to understand why effective communication (from the stand-point of the student) is often lacking. In lay English, they talk past each other because they see the same thing differently. Because the educator has institutionalized authority on his side, the student-adult must often tolerate the frustration of being regarded and treated as only a student.

The increasing economic necessity for advanced formal education deters the student-adult from withdrawing from the situation. Instead he must manage his emotions and continue to accept his "non-academic" subordination even if he may not consider it legitimate. If, however, an incident occurs which is perceived by the student-adult as a major infringement on his rights as an adult, whether it affects him directly or affects others with whom he identifies, it can mobilize him to protest activity if other channels of communication are believed to be ineffective. These critical incidents, which have been cited by some observers as the causes of student unrest, are only "triggering mechanisms" that depend upon the underlying stress arising from status inconsistency for their effects. The students who are provoked sufficiently to protest, then, will most likely be those who by cultural definition are both students and adults.

The theory of student unrest proposed here can be summarized as follows. Changes have recently occurred in education which have rendered the traditional cultural definition of the student role inadequate to guide effective interaction between educators and those students who are also adults. A revised cultural definition of student-adults consistent with the present reality, and specifying their rights, duties, and obligations, has not yet been formulated. These conditions are conducive to status inconsistency among some students and may be a source of stress that makes them prone to demonstrate given a critical incident which they perceive as an infringement upon their rights as adults.

Given this theoretical formulation, the specific issues about which students engage in protests are viewed only as "triggering mechanisms" of secondary importance to an understanding of student unrest. One would predict that, regardless of the apparent issue, the students who

are likely to experience status inconsistency (that is, those who possess characteristics associated with adult status in our culture) are more likely to become involved in protests than are other students. Further, involvement in protests should vary directly as the degree of status discrepancy. These two general statements were tested using two sets of more specific hypotheses (Lehtiniemi, 1970).

Procedure

Sample

To evaluate this theory of student unrest, a questionnaire was devised and administered to undergraduate students at two Ontario universities during the 1969-70 academic year. All respondents were enrolled in sociology courses, as previous studies had indicated that activist students were most highly concentrated in the social sciences (e.g. Trent & Craise, 1967). The questionnaire was administered to complete classes of students during scheduled lecture periods. Using this method, questionnaire non-response was negligible, and less than three per cent of the questionnaires were not usable because of excessive item non-response, or response patterns that indicated lying or disinterest on the part of respondents. A total of 225 usable questionnaires were obtained for analysis. This sample was adequate because the purpose was to test theory, and not to generalize descriptive properties to a larger population (on this issue, see Zetterberg, 1965:128-130).

Measures

Critical questionnaire items inquired about the sex, financial status, type of living accommodation, and decision-making practices in the family of origin of each respondent. These were selected as the independent variables in this study.

The respondents were also asked whether they had attended any of the various protests in which students from their university were known to have taken part and to indicate if they had become actively involved themselves. More than half of the respondents had attended at least one protest; 33 per cent indicated that they had actively participated in a protest. Actual involvement in protests was defined as the dependent variable.

Method

Two sets of hypotheses were tested. In the first set, the relationship between each of the four independent variables and involvement in protests was examined. It was predicted in each case that students who along an assumed dimension possessed attributes more characteristic of adulthood than "pre-adulthood" (i.e. those who would probably experience status inconsistency) were more likely to have been actively involved in protests than other students. The percentage of students in this category who had been involved in protests was compared to the percentage of the other students who had actively participated in protests.

A second set of hypotheses specified that the degree of potential status inconsistency would be positively related to student involvement in protests. To test for the predicted relationships, six typologies were constructed

by pairing the four independent variables in all ways possible. Three levels of status discrepancy were defined. Students who might be considered adults on both independent variables used in a given typology were designated as experiencing high status inconsistency. Those who would be considered adults on either one of the two variables were classified as experiencing moderate status inconsistency. The remaining students were regarded as low status discrepancy types. The hypotheses were tested by comparing the percentages of students in the three categories who had been actively involved in protests.

It was also argued that the effects of the independent variables would be additive. This was tested by comparing the measures of association obtained using the typologies with those obtained using the component variables separately. For these comparisons it was necessary to combine the moderate and low status inconsistency categories in each typology, even though collapsing would attenuate the measures of association obtained. Two unrelated measures of association were used in the comparisons to ensure that the results were not artifacts of the different "N's" in the cells.

Results

Using the four independent variables separately, all hypotheses in the first set were supported. For each variable, the students who approximated adults more than "pre-adults" (i.e. those who would experience status inconsistency) were more likely to have been involved in protests than other students. The relationships obtained are listed below, and the level of statistical significance of each is shown in brackets.

1. Students accustomed to taking part in making decisions that affected them (those who had taken active part in decision-making at home) were more likely to have been actively involved in protests than other students ($p < .02$).
2. Students who were financially independent of their parents were more likely to have been actively involved in protests than other students ($p < .02$).
3. Students living in "their own" independent place of residence were more likely to have been actively involved in protests than other students ($p < .05$).
4. Male students were more likely to have been actively involved in protests than female students ($p < .005$).

The relationship shown in Table 1 is typical of those obtained using the independent variables singly. The sex difference was expected because the male role in our culture emphasizes "becoming a man" by attaining autonomy and independence soon after physical maturation. In contrast, the female role is still characterized by dependence. In determining the statistical significance of the relationships, chi square values for these 2x2 tables were transformed to Z-scores (see Blalock, 1960, 218-219). Because the direction of the relationships was predicted, the probability associated with the chi square values was halved for a one-tail test of statistical significance.

TABLE 1

SEX OF STUDENTS AND INVOLVEMENT IN PROTESTS

Involvement in protest	Sex			
	Male		Female	
	(N)	(%)	(N)	(%)
Yes	50	40	24	24*
No	74	60	77	76
Totals	124	100	101	100

* $p < .005$ (one-tail chi square test)

The second set of hypotheses was also supported without exception. For each of the six typologies the students with high status inconsistency were the most likely to have been actively involved in protests. Low status inconsistency types were least likely to have been involved in each case. All six relationships were statistically significant beyond the .01 level. Table 2 shows a typical relationship. Sex and financial status were the component, independent variables used in that typology.

TABLE 2

LEVEL OF STATUS INCONSISTENCY AND INVOLVEMENT IN PROTESTS

Involvement in protests	Level of Status Inconsistency					
	High		Moderate		Low	
	(N)	(%)	(N)	(%)	(N)	(%)
Yes	41	45	21	27	12	22*
No	50	55	58	73	43	78
Totals	91	100	79	100	55	100

* $p < .005$ (one-tail chi square test)

The effects of the independent variables were additive. The measures of association obtained using any pair of variables together were in every case greater than those observed using either single independent variable. When *epsilon* values were compared, the strength of the relationships obtained using typologies exceeded those obtained using single, component variables by between two and eight percentage points. It should be noted that a conservative bias in the measures of association obtained using typologies was introduced by collapsing the moderate and low status inconsistency categories to produce dichotomies. When chi square values were compared, the relationships observed using typologies were again more significant statistically than those obtained using the component, independent variables separately.

Discussion

All the relationships examined in this study were in the predicted direction. These findings support the suggested explanation of student unrest. The degree to which they can be generalized, however, is an empirical question for the sample was restricted to undergraduates enrolled in sociology courses at only two Ontario universities. Nevertheless, until further research shows this explanation to be inadequate, it should not be disregarded in favour of speculative "quasi-theories" of student unrest.

If student unrest is interpreted as an outcome of social change which has rendered the traditional role definition of the student inadequate for today's social reality, then there are implications concerning how educators should respond. Rigid enforcement of the "established ways", backed up by police and legal sanctions appears to have been a response bearing high "costs" in terms of property damage and inciting sympathy protests. It can hardly be considered a positive mode of adaptation, and while it may have resulted in suppression of student unrest, it is a response to symptoms rather than to causes. Should a "law and order" mentality prevail, one might expect a build-up of higher levels of stress among student-adults, which when "triggered" could lead to more serious forms of protest activity. Alternatively students who now experience status discrepancy, if deterred from trying to help redefine their role, might be expected to succumb to behavioural disorders which have been associated with norm inadequacy. In this vein, Durkheim's (1951) classic study showing the relationship between anomie and suicide would perhaps be the most forceful example. Insisting on maintaining the *status quo,* as some educators have done by enforcing tradition, must be regarded as only "buying time", and the investment may be a poor one.

Instead of reaffirming existing status relationships in education, one might explore how they could be revised in order to cope more effectively with the demands of today. The traditional structure of education is not sacred. It is only a means to a higher end, that of conveying information, knowledge, and the ability to think and adapt to a usually younger generation to prepare them to cope with present and future conditions in society. If the system cannot function effectively as it exists as present, and it is questionable whether disruption and the process of education are compatible, then we must seek to improve it. The focus should not be exclusively on what is wrong with the students but also on what might be wrong with the structure of education. While this latter orientation might appear as a threat to the security of some educators who have grown accustomed to their generalized statuses vis-a-vis the students, it should not be summarily dismissed as a potential means of successful adaptation to changed social conditions.

Fortunately, some educational administrators have initiated institutional changes, although usually in response to or as a result of on-going or threatened disturbances. Foster and Long (1970) cite examples at American universities, and readers familiar with higher education in Canada will be aware that parallel events are taking place at many Canadian universities. In many cases these changes do entail a redefinition of the status of students, evidenced by the broadened rights and privileges implicitly conferred upon them, especially with regard to partici-

pation on decision-making bodies at various levels within the university. The effectiveness of these changes as a means of successfully adapting to changed social reality cannot yet be realistically evaluated. However, on the basis of the theory of student unrest suggested here, one would predict that granting the student the rights of adulthood in the academic community will reduce future unrest on the campuses.

References

Blalock, H. M. *Social statistics.* New York: McGraw-Hill, 1960.

Durkheim, E. *Suicide.* (J. A. Spaulding & G. Simpson, trans.), Glencoe, Illinois: Free Press, 1951.

Foster, J., & Long, D. The dynamics of institutional response. In J. Foster & D. Long (Eds.), *Protest! student activism in America.* New York: Morrow, 1970.

Lehtiniemi, L. *A theory of student unrest.* Unpublished M.A. thesis, University of Waterloo, 1970.

Trent, J. W. & Craise, J. L. Commitment and conformity in the American college. *Journal of Social Issues,* 1967, 22, No. 3, 34-51.

Zetterberg, H. L. *On theory and verification in sociology.* Totowa, N.J.: Bedminster Press, 1965.

The Alberta Journal of Educational Research *Vol. XVIII, No. 1, March, 1972*

P. C. SMYTHE, MADELINE HARDY,
R. G. STENNETT, and H. R. WILSON

Developmental Patterns in Elemental Reading Skills: Phoneme Discrimination[1]

In an attempt to develop a brief test of children's ability to discriminate among 42 English phonemes, 104 children in grades 1-4 were required to make a judgment of "same" or "not the same" to each of 1,291 pairs of items. The ratio of "not the same" (target) items to "same" (buffer) items was 2:1. The test items were administered as 60-item subtests, one per day, over a three-week period. Data analysis revealed developmental trends and an unexpectedly high level of competence in children's ability to discriminate among "pure" phonemes. The results are related to more commonly used tests of children's auditory discrimination. (Dr. Smythe, Research Associate, and Dr. Stennett, Chief of Educational Research Services, are members of the London Board of Education; Dr. Hardy is an Associate Professor at Althouse College of Education; Dr. Wilson is Chairman of the Linguistics Group, English Department, University of Western Ontario. All of these institutions are located in London, Ontario.)

In connection with a larger study attempting to determine the development of some of the elemental skills involved in learning to read (Stennett, Smythe, Hardy, Wilson & Thurlow, 1970), a preliminary investigation was made of the development of children's ability to discriminate phonemes. Preceding this study a review of the literature in the area of auditory abilities (Hardy, Stennett, & Smythe, 1970) revealed considerable agreement among authorities that auditory perception was considered a critical factor in learning to read and was closely related to reading performance.

The area of auditory discrimination or perception at the level of individual phonemes has not been widely investigated in relation to beginning

[1] This study was supported in part under a grant (S70-0723) from the Canada Council. The authors would like to express their appreciation to the following people who assisted in the execution of this study: Mr. Bruce Spencer, Principal, and the primary teachers of the Emily Carr Public School; Mr. George Robbins, Principal, Mr. Walter Rows and Mr. John Stewart of the Language Department of Sir Frederick Banting Secondary School; and Mrs. Mary Singeris who served as test administrator.

reading. Moreover, because of difficulty with measurement at early ages, most of the work has been done with school-age children. Templin (1957) conducted an extensive study with children from three to eight years of age and discovered that sound discrimination ability showed consistent increase with age, with a deceleration of the rate of growth occurring between four years, six months and five years. Impellizzeri (1967) also found a developmental trend in auditory perceptual ability of normal children aged five to eight years.

The concept of distinctive features of speech sounds was used by Jacobson and Halle (Cherry, 1965) in presenting a developmental description of speech discrimination acquisition. The results of their work indicate that acquisition follows a sequence of successive binary contrasts, from those that are highly discriminable to those with minimal difference. Tikofsky and McInish (1968), using the concept of distinctive features as developed by Jacobson and Halle, determined that by the age of seven years children are able to discriminate accurately between initial consonants, except for a small group of contrasting consonants which are difficult even for adults.

In spite of the importance of auditory perception in the process of learning to read, the available developmental data on the acquisition of this skill are much too global in nature. Although it has been determined that developmental trends in the acquisition of auditory perception do exist, there is no information regarding the age levels at which certain phoneme discriminations are established. How many phonemes, and which ones, for example, can children be expected to discriminate upon entering grade one?

As well as being too global in its approach, interpretation of the research findings on auditory perception is complicated by the variety of approaches used in test construction. Tests of phoneme discrimination have typically employed comparisons of simple words or nonsense syllables, with the child being required to make a judgment of similarity or difference. With the three to five-year-old subjects, Templin (1957) used pairs of words such as 'coat-goat', and with children from six to eight years, pairs of nonsense syllables such as 'os—oth'. Tikofsky and McInish (1968) also employed pairs of words or syllables in their study while Impellizzeri (1967) used pictures in part of her study, with the child required to choose from four pictures the one which matched the stimulus word presented. All methods described suffer from lack of precision due to the possible contribution of factors other than auditory perceptual ability. The demands of what appears to be a simple test of auditory discrimination are indeed very complex. In tests using the 'similarity-difference' response format, the subject is required to attend to the two stimuli being presented, retain these several sounds in memory, internally compare the sounds or their representations, and make a decision of similarity or difference. An excellent review and critique of several of the more widely used tests of auditory discrimination is contained in a recent study by Rudegeair and Kamil (1970).

Because of the potential complexity of task demands and, more importantly, of the interpretation of results of a test using nonsense syllables

or words, it was decided to attempt to construct a test of auditory discrimination using the forty-two simplest sound elements in the English language, the 'pure' phonemes, pairing each of them with every other phoneme.

Method

Subjects

The 104 subjects involved in this study were enrolled in grades 1 through 4 at the Emily Carr Public School in London, Ontario. The number of pupils at each grade level was: grade 1-28, grade 2-28, grade 3-27, and grade 4-21. A preliminary pilot investigation indicated that the test format and task demands were too difficult for children below the grade 1 level.

Test Construction

The forty-two phonemes used in this study are presented in Table 1.

TABLE 1

FORTY-TWO PHONEMES USED IN TEST CONSTRUCTION ALONG WITH THEIR IPA EQUIVALENTS

Phoneme	I P A Symbol	Phoneme	I P A Symbol
ē	i	f	f
ĭ	I	h	h
ĕ	ɛ	w	w
ă	əe	y	j
ŏ	ɔ	k	k
ŭ	ʌ	b	b
o͝o	ʉ	d	d
o͞o	u	g	g
ō	o	r	r
schwa	ə	s	s
ā	e	sh	ʃ
ī	ai	ch	tʃ
ū	ju	t	t
ar	ər	th_1	θ
ur	ɜr	v	v
ow	ay	l	l̩
oy	oi	th_2	ə̯
m	m	z	z
n	n	$ʒ^h$	ʒ
ng	ŋ	j	$d_ʒ$
p	p	wh	hw

Note—Notation based on the system employed by the International Phonetic Association.

It was not possible on the basis of existing knowledge to develop rational, *a priori* techniques for sampling from the population of all pairwise comparisons of the 42 phonemes. Therefore, it was necessary to test each phoneme against all other phonemes. As this procedure results in a massively large number of comparisons, it was further decided to test

for item discrimination in one direction only. Thus, the pair /ă/-/ā/ might be included whereas the pair /ā/-/ă/ would not. The choice of one pairing direction rather than the other was determined in a random and somewhat arbitrary fashion. All heterogeneous pairs (i.e. vowel-consonant) were presented only in the order vowel-consonant and never as consonant-vowel. With all 42 phonemes paired in this manner, a total of 861 pairs were formed with the following number of pairs in each category; Vowel-Vowel (V-V) 78, Consonant-Consonant (C-C) 406, and Vowel-Consonant (V-C) 377. As the discrimination test required subjects to make a judgement of "same" or "not the same"[2] it was also necessary to create a number of buffer pairs made up of pairings of the same phoneme with itself. The ratio of "same" (buffer) items to "not the same" (target) items was also determined, in part, by practical considerations. In order to control for guessing or random responding yet keep the size of the test within reasonable limits, a ratio of two target items to one buffer item was selected. That is, another 430 pairs of buffer items were combined with the 861 target pairs to produce a test involving 1,291 paired comparisons. The 430 homogeneous buffer pairs contained 88 V-V and 342 C-C pairs.

For purposes of administration, the 1,291 pairs were used to create 21, 60-pair subtests and one final subtest of 31 pairs. Each 60-pair subtest was composed of 40 target items (4 V-V, 19 C-C, and 17V-C) and 20 buffer items (4V-V and 16 C-C). The 31-pair subtest included all target items left after the 60-pair tests were constructed (0 V-V, 9 C-C, 12 V-C) along with buffer items (5 V-V and 5 C-C). The ordering of items within any subtest was randomly determined.

Test Administration

Each of the twenty-two subtests of the phoneme discrimination test was tape recorded by one of the authors. Items were recorded at the rate of one pair per two seconds with a three second inter-pair interval during which subjects made their responses. The tests were administered by a teacher who was given instruction in the necessary procedures and techniques.[3] Testing was carried out in the language laboratory of Sir Frederick Banting Secondary School, the building in which the Emily Carr Public School was located.

Before being taken to the language laboratory, the test administrator and the supervisor worked with each class in their individual classrooms in order to familiarize the children with the procedures to be used in the actual testing. The pupils were asked to listen to and discriminate between pairs of phonemes and to state orally whether they were the same or not the same. They were than taught to record their responses to ten practice items on a pre-printed answer sheet which contained spaces for responses to six sets of ten phoneme discriminations. A check mark was used to indicate a phoneme pair which was the same and an X to indicate a pair that was different. Following this classroom work, each class was taken to the language laboratory for a trial run using the earphones, taped sounds, and the answer sheet.

---

[2] A preliminary investigation suggested that the "same-not the same" concept was less ambiguous or was at least more clearly understood than the concept "same-different" for the youngest age group tested.

[3] Dr. Hardy made the tapes and supervised their administration which was carried out by Mrs. M. Singeris.

The twenty-two subtests were administered during a period of twenty-two consecutive school days in May and June, 1970. Testing time was twelve minutes per class per day. At the end of the testing period several days were used for make-up testing with pupils who had been absent.

Data Handling and Analysis

All data for each child were coded, keypunched into cards, verified, written onto magnetic tape, edited and corrected. All subsequent analyses were done using an IBM 7040 computer.

The basic analyses to be reported include: (1) a comparison of children's overall performance as a function of grade level, (2) as a function of pair type and (3) a factor analytic examination of errors made on the target pairs by all children.

Results

Performance as a Function of Grade Level

A percent correct score for each child was calculated by computer based on his responses to all of the 1,291 items. A one-way analysis of variance was then computed using these scores with grade as an independent factor. Table 2 presents the mean percent correct responses to all test items for each of the grades.

TABLE 2

MEAN PERCENT CORRECT PHONEME PAIR DISCRIMINATIONS FOR 1,291 PAIRS AS A FUNCTION OF GRADE LEVEL

	Grade			
	1	2	3	4
M	90.46%	92.50%	95.92%	97.05%
SD	9.62%	6.10%	2.51%	1.99%
N	28	28	27	21

The analysis of variance yielded an F of 6.247 which was highly significant (df = 3/100, $p < .001$). Inspection of Table 2 reveals a clear developmental trend with performance increasing with grade level. To test the significance of the differences between the various grade-level means, a series of comparisons were made employing the Scheffé method (Ferguson, 1966, p 295). Using the fairly stringent criteria for significance that the Scheffé method requires, only two comparisons reached significance. Both of these involved the grade 1 class; in one case with grade 3, $F_{(1-3)} = 10.919$, df = 3/100, $p < .05$, and in the other grade 4 performance $F_{(1-4)} = 13.920$, df = 3/100, $p < .01$. As well as the clear developmental trends another striking feature of the data revealed in Table 2 is the impressive level of performance for all four groups. Even the grade 1 pupils were able to master an average of 90% or 1,162 of the 1,291 target item discriminations.

Performance as a Function of Pair Type

Table 3 presents the mean percentage of correct responses to each phoneme and (a) all of the comparisons of it with each vowel, and (b) all of the comparisons of it with each consonant.

TABLE 3

MEAN PERCENT CORRECT RESPONSES TO EACH PHONEME WHEN PAIRED WITH ALL VOWELS AND ALL CONSONANTS

Vowel Phonemes	Vowels	Consonants	Consonant Phonemes	Vowels	Consonants
ē	1. 97.94	97.62	ar	14. 96.72	96.61
ĭ	2. 96.32	96.53	ur	15. 96.38	93.45
ĕ	3. 97.12	97.14	ow	16. 97.33	97.00
ă	4. 96.86	96.92	oy	17. 97.48	96.07
ŏ	5. 97.32	97.10	m	18. 98.43	95.54
ŭ	6. 88.94	97.17	n	19. 96.50	93.12
o͝o	7. 96.69	96.92	ng	20. 97.77	94.83
o͞o	8. 96.46	97.20	p	21. 94.64	95.26
ō	9. 96.66	97.08	f	22. 96.46	94.03
schwa	10. 90.00	97.27	h	23. 98.01	96.99
ā	11. 98.13	96.98	w	24. 96.25	95.98
ī	12. 97.66	97.37	y	25. 97.28	96.97
ū	13. 97.61	97.28	k	26. 97.78	96.84
			b	27. 97.38	96.56
			d	28. 97.08	96.78
			g	29. 96.86	94.53
			r	30. 97.25	93.94
			s	31. 97.02	97.08
			sh	32. 97.81	96.50
			ch	33. 96.88	93.27
			t	34. 97.51	96.18
			th_1	35. 97.72	92.90
			v	36. 97.06	90.69
			l	37. 97.25	97.15
			th_2	38. 97.02	92.79
			z	39. 98.29	95.54
			$_3$h	40. 96.40	96.72
			j	41. 91.06	97.34
			wh	42. 97.25	95.11

The mean percent correct responses for each of the three basic pair types was also calculated from the data in Table 3, resulting in the following means and standard deviations; V-C, $\overline{X}$ = 96.99%, SD = 1.11%; V-V $\overline{X}$ = 95.98%, SD = 2.84%; C-C, $\overline{X}$ = 95.36%, SD = 1.68%. All possible comparisons among these means were made using independent *t* tests. The only difference to reach statistical significance involved V-C and C-C pairs, (t = 4.584, df = 69, $p < .01$) with V-C performance being superior to performance on C-C pairs. Although statistically significant, this difference is small in absolute size and represents a spread of approximately 1.5% or 14 pairs.

Factor Analysis

In order to make a more detailed examination of the kinds and patterns of errors pupils made, the percentage of all students failing each pairwise comparison involving target items was calculated and placed in a matrix. This "confusion" matrix was factored using the Jacobi-Kelly technique to produce a principal axis matrix which was in turn rotated to a normalized solution using the varimax method.[4] Five factors with eigenvalues $>$ 1.0 were extracted and the rotated factor matrix is given in Table 4.

TABLE 4

ROTATED FACTOR MATRIX

Variable	I	II	III	IV	V	Variable	I	II	III	IV	V
1. ē	01	-04	02	02	07	22. f	-01	-01	00	87	19
2. ĭ	04	-01	03	04	14	23. h	04	-02	00	01	11
3. ĕ	02	-03	04	01	10	24. w	04	-04	01	01	22
4. ă	02	-05	02	02	10	25. y	06	-03	00	03	11
5. ŏ	06	-02	03	02	10	26. k	07	-02	03	01	08
6. ŭ	02	-02	94	-01	14	27. b	04	-01	04	01	11
7. o͝o	01	-04	01	03	12	28. d	05	-03	02	04	10
8. o͞o	03	-03	02	01	11	29. g	02	-02	03	02	09
9. ō	03	-02	03	02	11	30. r	01	-99	-01	-01	11
10. schwa	02	01	94	02	14	31. s	02	00	01	02	12
11. ā	02	-02	01	02	11	32. sh	01	-05	02	04	11
12. ī	04	-06	01	01	07	33. ch	01	-04	02	02	12
13. ū	06	-03	02	02	08	34. t	06	-04	04	02	10
14. ar	05	-03	03	01	10	35. th_1	07	00	01	89	16
15. ur	00	-98	00	00	13	36. v	84	00	01	-01	14
16. ow	03	-02	03	04	09	37. l	06	-01	-01	04	12
17. oy	03	-05	01	03	10	38. th_2	85	01	-03	02	14
18. m	-02	06	-09	-12	50	39. z	05	-03	00	05	14
19. n	-08	08	-08	-12	66	40. ʒh	04	-02	04	01	10
20. ng	-08	06	-04	-10	51	41. j	01	-01	02	02	11
21. p	03	-01	02	06	18	42. wh	05	-02	01	03	23

Inspection of the rotated factor matrix reveals very simple factor structures. Four of the five factors extracted are defined by loadings from single pairs of phonemes while the fifth factor receives substantial loadings from only three items. These patterns are no doubt the result of the fact that performance was near perfect, or at least very high, on almost all of the target pairs on the test and this in turn resulted in low error values entered in most of the cells of the confusion matrix. What the factor analytic solution does is to show the relationships among those few items where a substantial number of errors occurred.

Factor I is defined by loadings from the phonemes /v/ and /th_z/, both of which are fricative consonants. Both of these items are similar in terms of place of articulation and it is not surprising, therefore, that

[4] Copies of this confusion matrix are available directly from the senior author.

students who had difficulty with one should also experience difficulty with the other.

Factor II represents confusions resulting from two phonemes involving 'r' sounds, i.e. /r/ and /ur/. Apparently the two sounds differ in such a subtle way from each other that the difference is not functionally significant for the majority of the children tested.

Factor III is a vowel confusion factor again representing two sounds which are highly similar, namely /ŭ/ and /schwa/.

Factor IV is another fricative confusion factor involving the phonemes /f/ and /th_1/. It is perhaps somewhat unexpected that the items in Factors I and IV should show no overlap with each other especially in the case of the two /th/phonemes.

Finally, Factor V, the most complex of the factors extracted, is defined by loadings from the three nasal phonemes /m/, /n/, and /ng/.

Summary and Conclusions

An attempt was made to develop the present test on the basis of the comparison of "pure phonemes" but, because it is virtually impossible to enunciate certain phonemes, e.g. /p/, in isolation, an unstressed vowel sound was added to the phoneme when necessary.

One of the objectives in the construction of the test was to achieve simplicity of format. Although the phoneme discrimination test is simpler than most auditory discrimination tests, performance on each pairwise comparison was obviously also influenced by certain minimal memory requirements imposed by the temporal sequencing of the pair elements.

The overall performance on the test was extremely high, at all grade levels, one to four. Nevertheless, a clear developmental trend was indicated, substantiating the earlier findings of Templin (1957) and Impellizzeri (1967).

An examination of the errors revealed that very few phoneme pairs were contributing to the test difficulty. Contrary to a previous informal hypothesis, i.e., that vowel-vowel pairs would give most difficulty, it appeared, rather, that difficult pairs were made up of consonants which were similar in place of articulation, e.g., /v/ /th_2/, /f/ /th_1/, /m/ /n/ /ng/. This finding is confirmed by similar evidence reported by Rudegeair and Kamil (1970) who suggest that most currently used tests of auditory discrimination yield an inflated estimate of discrimination difficulties. Moreover, they found that the same three contrasts accounted for 43% of all errors in one of their discrimination tasks.

It seems possible to conclude that by the time children complete grade one they experience very few phoneme discrimination difficulties, at the level of the "pure phoneme".

It is obvious that the measurement of ability in phoneme discrimination should begin prior to the end of grade one. There is need, then, for a simple and short test for use with young children. This test might be constructed using a representative sampling of phonemes, on the basis of the various categories of speech sounds. For older children, measurement of discrimination of more complex sound units should be explored, e.g. blends, digraphs and syllables.

The children in our sample represented a considerable range of reading ability (i.e., grade 1 through grade 4) and yet the corresponding range of auditory discriminatory ability at the individual phoneme level was surprisingly narrow. We would suggest, therefore, that some of the more popular tests of auditory discrimination gain some of their variability across *S*s from the contribution of factors other than auditory discrimination ability. Such tests must be carefully scrutinized to discover just what factors are influencing the total test scores. The extent to which auditory discrimination scores have been shown to be correlated with success in learning to read or with tests of more advanced reading ability may merely reflect differences in these other abilities. The present results suggest that this may well be the case but, unfortunately they do not reveal just what these other factors are. At an intuitive level, such subskills as the ability to segment strings of auditory signals or the extent to which *S*s can retain a series of individual phonemes in short-term or immediate memory become likely suspects. More formal analyses, both logical and empirical, of auditory discrimination tests will no doubt isolate other factors for investigation.

References

Cherry, C. *On human communication: a review, a survey and a criticism.* Cambridge, Massachusetts: M.I.T. Press, 1965.

Hardy, Madeline, Stennett, R. G. & Smythe, P. C. Concepts, instructional strategies and research in beginning reading: A review. Paper read at the Annual Meeting of the Ontario Educational Research Council, Toronto, 1970.

Impellizzeri, Irene H. Auditory perceptual ability of normal children aged five through eight. *The Journal of Genetic Psychology,* 1967, *111,* 289-294.

Stennett, R. G., Smythe, P. C., Hardy, Madeline, Wilson, H. R., & Thurlow, Merle. Developmental patterns in elemental reading skills: Preliminary report. London Board of Education, London, Ontario, Canada, 1970. (Mimeo)

Templin, Mildred C. *Certain language skills in children.* University of Minnesota Press, 1957.

Tikofsky, Ronald S. & McInish, J. R. Consonant discrimination by seven year olds: A pilot study. *Psychonomic Science,* 1968, *10,* 61-62.

Rudegeair, R. E., & Kamil, M. L. Assessment of phonological discrimination in children. *Technical Report from the Research and Development Center for Cognitive Learning,* The University of Wisconsin, 1970, No. 118.

IN THE NEXT ISSUE OF AJER

A. D. Bowd	*Some Determinants of School Achievement in Several Indian Groups*
R. C. Conklin and J. Phelps	*Difference Between Applicants and Enrollees in a Mature Non-Matriculant Program*
V. K. Corfield	*Programmed Instruction as a Tool to Facilitate Perception of Alternatives*
D. Friesen	*Variations in Perceptions of Organizational Climate*
E. S. Hickox and D. J. Ducharme	*Administrative Staffing Patterns in Ontario School Boards*
E. H. Humphreys	*Inequality and Rural Schools*
R. N. MacGregor	*A Review of Selected Art Tests and Evaluative Instruments*
D. M. Richards	*The Social Demand for Teachers*
A. G. Storey	*Self Development in Adult Male Students in Relation to Success and Non-Success*

Research in Education

Edited by F. MUSGROVE and H. J. BUTCHER

CONTENTS OF NUMBER 7, MAY 1972

J. A. Wilson	Personality and attainment in the primary school II—Personality structure and attainment of ten-year-olds
B. F. A. Tipton	Some organisational characteristics of a technical college
J. Garner	Some aspects of behaviour in infant school classrooms
S. Hatch	Student protest: supporters and opponents
L. Cohen and K. Boothroyd	Community expectations of the teacher's role: some mistaken perceptions of primary school teachers
K. Drake	Explorations in adult education costing—II
Book Reviews	

RESEARCH IN EDUCATION is published twice-yearly, in May and November, by Manchester University Press. Annual subscriptions are $7.00 (post free); single copies are $4.00.

MANCHESTER UNIVERSITY PRESS
316-324 Oxford Road
Manchester M13 9NR, England